

**OFFICE, CHIEF OF ENGINEERS**  
**CONTRACT NO.**

**ENGINEERING STUDY**  
**RESISTANT DESIGN**  
**BUILDING**

**PREP**  
**AMMANN**  
**CONSULTING**  
**NEW**

**Best Available Copy**

AD62575

APPENDIX H

S, DEPARTMENT OF THE ARMY  
DA 49-129-ENG-317

# Y OF ATOMIC BLAST GN FOR SEVERAL G TYPES

PREPARED BY

& WHITNEY

ENGINEERS

YORK, N.Y.

MAR 1950

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OFFICE, CHIEF OF ENGINEERS, C  
CONTRACT NO. DA 4

ENGINEERING STUDY  
RESISTANT DESIGN  
BUILDING

PREPARED

AMMANN & W  
CONSULTING EN  
NEW YORK.

DRAWING L

DWG NO 60-16-01 PROTECTIVE CONSTRUCTION - ADMINISTRATION BUILDING

SHEETS 1 THRU 3 OF 3 10 PSI BLAST RESISTANT  
SHEETS 1 THRU 3 OF 3 20 PSI BLAST RESISTANT  
SHEETS 1 THRU 3 OF 3 30 PSI BLAST RESISTANT

DWG NO 60-02-06 PROTECTIVE CONSTRUCTION - COMMUNICATIONS BUILDING

SHEETS 1 THRU 3 OF 3 10 PSI BLAST RESISTANT  
SHEETS 1 THRU 3 OF 3 50 PSI BLAST RESISTANT  
SHEETS 1 THRU 3 OF 3 30 PSI BLAST RESISTANT

DWG NO 60-17-01 PROTECTIVE CONSTRUCTION - WAREHOUSE

SHEETS 1 THRU 3 OF 3 10 PSI BLAST RESISTANT  
SHEET 1 OF 1 20 PSI BLAST RESISTANT  
SHEET 1 OF 1 30 PSI BLAST RESISTANT

DWG NO 60-17-02 PROTECTIVE CONSTRUCTION - EARTH COVERED, CONCRETE IGLOO

SHEET 1 OF 1 25 PSI BLAST RESISTANT  
SHEET 1 OF 1 60 PSI BLAST RESISTANT  
SHEET 1 OF 1 100 PSI BLAST RESISTANT  
SHEET 1 OF 1 200 PSI BLAST RESISTANT

DWG NO 60-18-01 PROTECTIVE CONSTRUCTION - EARTH COVERED, RECTANGULAR

SHEETS 1 THRU 3 OF 3 25 PSI BLAST RESISTANT  
SHEETS 1 THRU 3 OF 3 60 PSI BLAST RESISTANT  
SHEET 1 OF 1 100 PSI BLAST RESISTANT  
SHEET 1 OF 1 200 PSI BLAST RESISTANT

DWG NO 60-18-02 PROTECTIVE CONSTRUCTION - EARTH COVERED, DOUBLE BARREL ARCH

SHEET 1 OF 1 30 PSI BLAST RESISTANT

DWG NO 60-18-03 PROTECTIVE CONSTRUCTION - EARTH COVERED, DOME

SHEET 1 OF 1 50 PSI BLAST RESISTANT  
SHEET 1 OF 1 100 PSI BLAST RESISTANT  
SHEET 1 OF 1 200 PSI BLAST RESISTANT

RS, DEPARTMENT OF THE ARMY  
D. DA 49-129-ENG-317

# ODY OF ATOMIC BLAST IGN FOR SEVERAL NG TYPES

PREPARED BY

N & WHITNEY

ULTING ENGINEERS

EW YORK, N.Y.

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## DRAWING LIST

DWG NO 60-18-04 PROTECTIVE CONSTRUCTION - BURIED, RECTANGULAR

SHEETS	1 THRU 2	OF 2	80 PSI BLAST RESISTANT
SHEET	1	OF 1	100 PSI BLAST RESISTANT
SHEET	1	OF 1	200 PSI BLAST RESISTANT

DWG NO 60-18-05 PROTECTIVE CONSTRUCTION - BURIED, DOUBLE BARREL ARCH

SHEETS	1 THRU 2	OF 2	80 PSI BLAST RESISTANT
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DWG NO 60-18-06 PROTECTIVE CONSTRUCTION - BURIED, DOME

SHEETS	1 THRU 2	OF 2	80 PSI BLAST RESISTANT
SHEET	1	OF 1	100 PSI BLAST RESISTANT
SHEET	1	OF 1	200 PSI BLAST RESISTANT

DWG NO 60-18-07 PROTECTIVE CONSTRUCTION - BURIED, CONCRETE IGLOO

SHEETS	1 THRU 2	OF 2	80 PSI BLAST RESISTANT
SHEETS	1 THRU 2	OF 2	100 PSI BLAST RESISTANT
SHEETS	1 THRU 2	OF 2	200 PSI BLAST RESISTANT

AMMANN & WHITNEY 111 8TH AVENUE NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY ENGINEERING DIVISION WASHINGTON, D. C.	
DESIGNED BY P. J. W.		TITLE SHEET	
CHECKED BY [Signature]		DRAWING NUMBER	
APPROVED BY [Signature]		DATE	
DATE		SHEET OF	

GE

THE FOLLOWING DRAWINGS ARE PART OF A REPORT, "ENGINEERING OF DIFFERENT BUILDING TYPES", FEBRUARY 1959, SUMMARIZING THE DESIGN OF DESIGN FOR ATOMIC BLAST RESISTANCE AND THE ESSENTIAL LOADINGS. THE ADMINISTRATION, COMMUNICATIONS AND EXISTING STANDARD TYPE STRUCTURES WITHOUT CHANGING THE NON STANDARD TYPE STRUCTURES, I.E., IGLOO, RECOMMENDED BY OCE. THE DESIGN PROCEDURES, UNLESS OTHERWISE SPECIFIED, ARE BASED ON THE DRAFT OF THE CORPS OF ENGINEERS MANUALS EM 1110 - "DESIGN OF STRUCTURES TO RESIST THE EFFECTS OF ATOMIC WEAPONS". THESE DRAWINGS ARE INTENDED TO BE USED FOR PLANNING PURPOSES AND AS THE BASIS FOR DEVELOPING GROUND STRUCTURES. THE THICKNESS OF THE WALLS AND ROOFS OF COVERED AND BURIED STRUCTURES AND THE SHELTER ARE DESIGNED TO PROTECT AGAINST THE INITIAL NUCLEAR BOMB AND ADEQUATE SHIELDING FROM FALLOUT RADIATION. THE ADMINISTRATION, COMMUNICATION AND WAREHOUSE BUILDINGS WILL REQUIRE ADDITIONAL ANALYSES WHICH WERE NOT

## GENERAL NOTES

ENGINEERING STUDY OF ATOMIC BLAST RESISTANT DESIGN FOR SEVERAL  
ING THE RESULTS OF A STUDY TO DETERMINE THE PRACTICABILITY  
ESTIMATED CONSTRUCTION COST FOR A RANGE OF BLAST PRESSURE  
WAREHOUSE DRAWINGS ARE BASED UPON THE HARDENING OF  
GING THE INTERIOR CONFIGURATIONS. THE INTERIOR CONFIGURATIONS OF  
RECTANGULAR, DOUBLE AND DOME, ARE BASED UPON DIMENSIONS  
OTHERWISE NOTED IN THE REPORT WERE BASED UPON THE PRELIMINARY  
345 - 413 THROUGH 421, "DESIGN OF STRUCTURES TO RESIST THE  
NTENDED TO DEPICT THE RESULTS OF THE DESIGN STUDY ONLY THEY  
TO REPRESENT RECOMMENDED DESIGN HOWEVER THEY CAN BE USED  
VELOPMENT OF REQUIRED DESIGNS. IN THE DESIGN OF EXPOSED ABOVE  
ND ROOF WERE DETERMINED BY BLAST RESISTANCE REQUIREMENTS  
ADEQUATE SHIELDING FROM FALLOUT ISOLATION HOWEVER, THE EARTH  
AREAS IN THE EXPOSED ABOVE GROUND STRUCTURES HAVE BEEN  
AR RADIATION AS NOTED ON THE DRAWINGS AND THEREFORE AFFORD  
PROVISION OF ADEQUATE THICKNESS IN THE WALLS AND ROOF OF THE  
INGS TO PROVIDE THE REQUIRED SHIELDING FROM FALLOUT RADIATION  
NOT INCLUDED IN THIS CONTRACT







SCALE 1" = 100'



#### ADMINISTRATIVE

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#### MATERIALS

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ARCHITECTURAL

2

<b>AMMANN &amp; WHITNEY</b> 111 5TH AVENUE, NEW YORK, N. Y.		<b>DEPARTMENT OF THE ARMY</b> OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING	
<b>PROTECTIVE CONSTRUCTION</b> <b>ADMINISTRATION BUILDING</b> <b>10 PSI BLAST RESISTANT</b>		DRAWING NUMBER <b>60-10-01</b>	
DATE: MAY 1960		SHEET 2 OF 2	

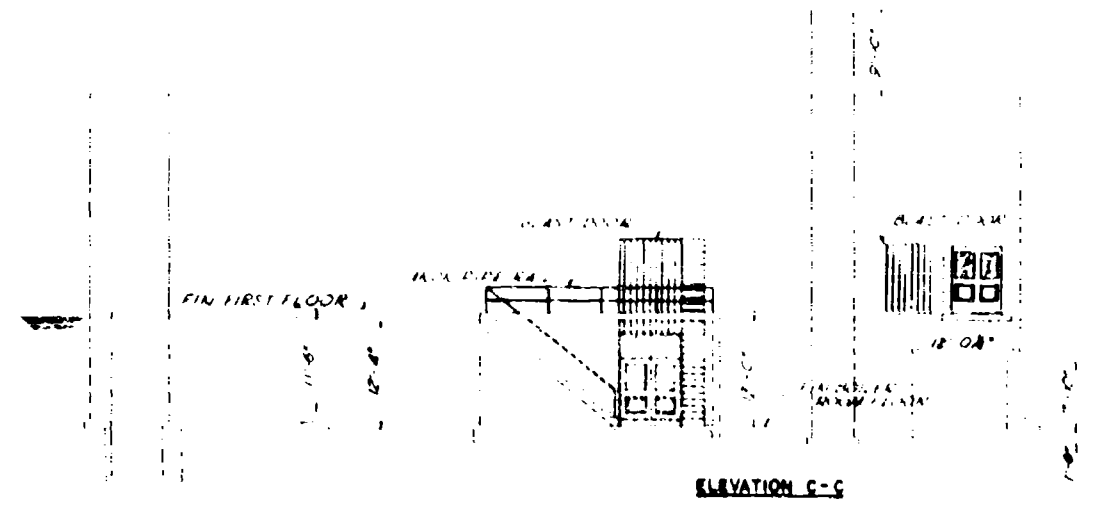




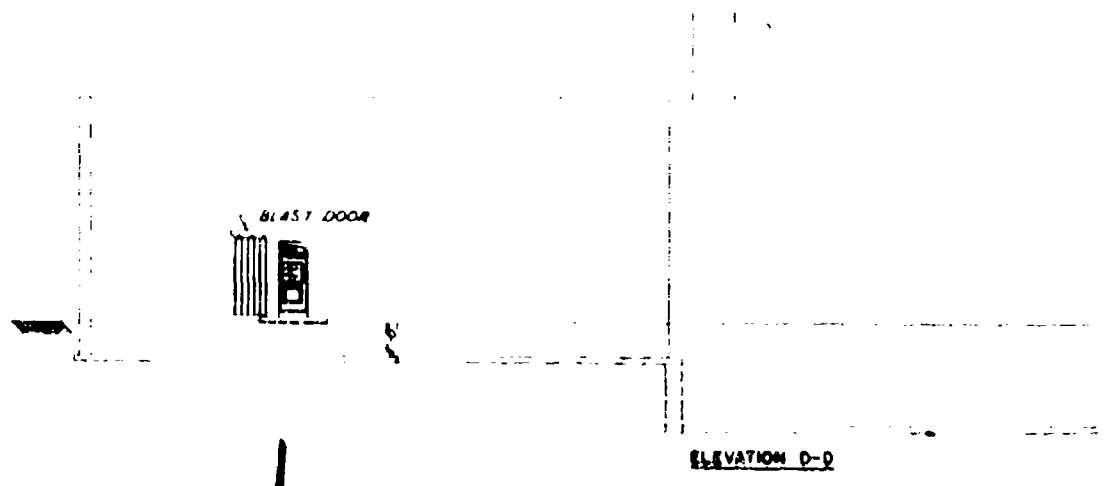
ELEVATION A-A



ELEVATION B-B

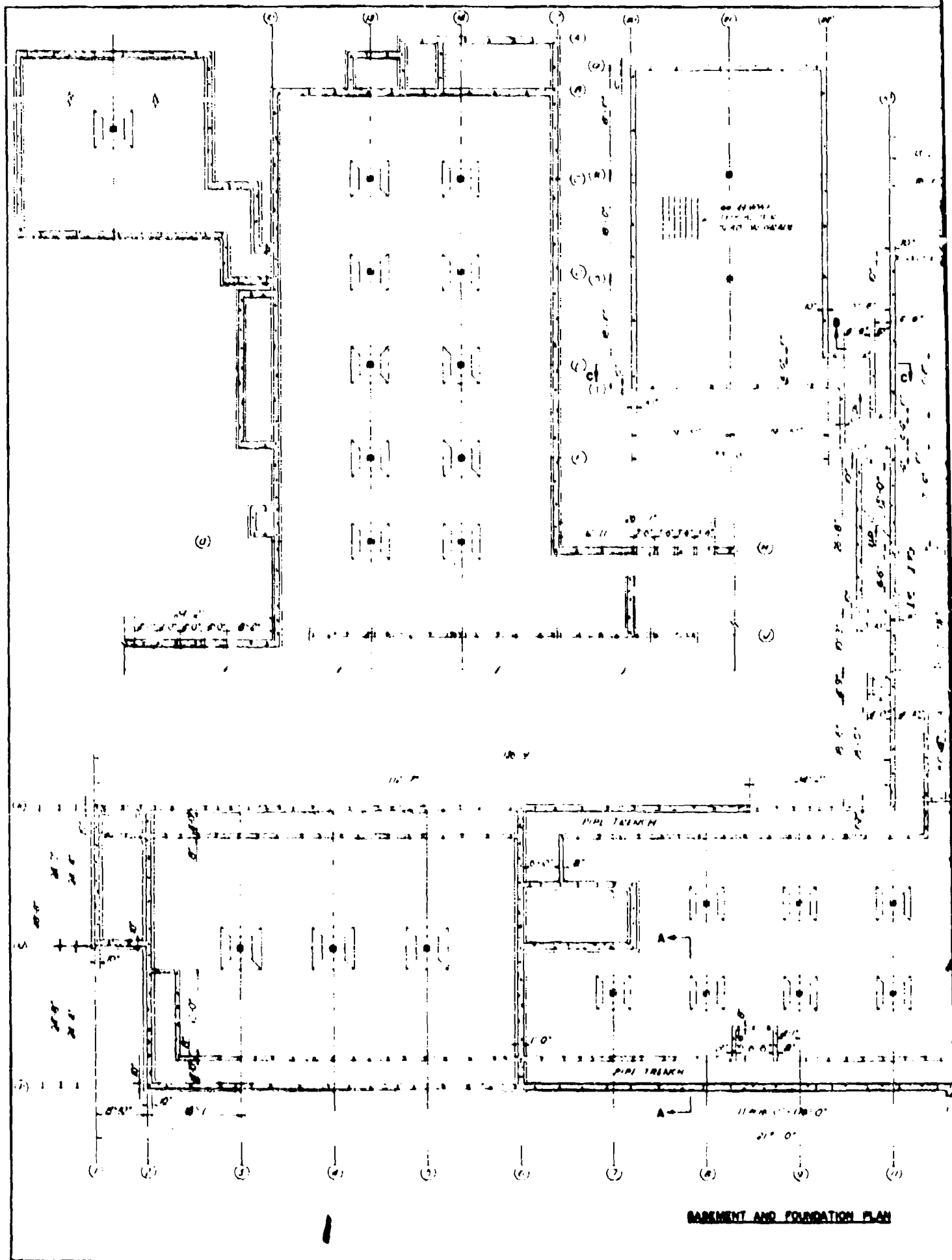


ELEVATION C-C



ELEVATION D-D





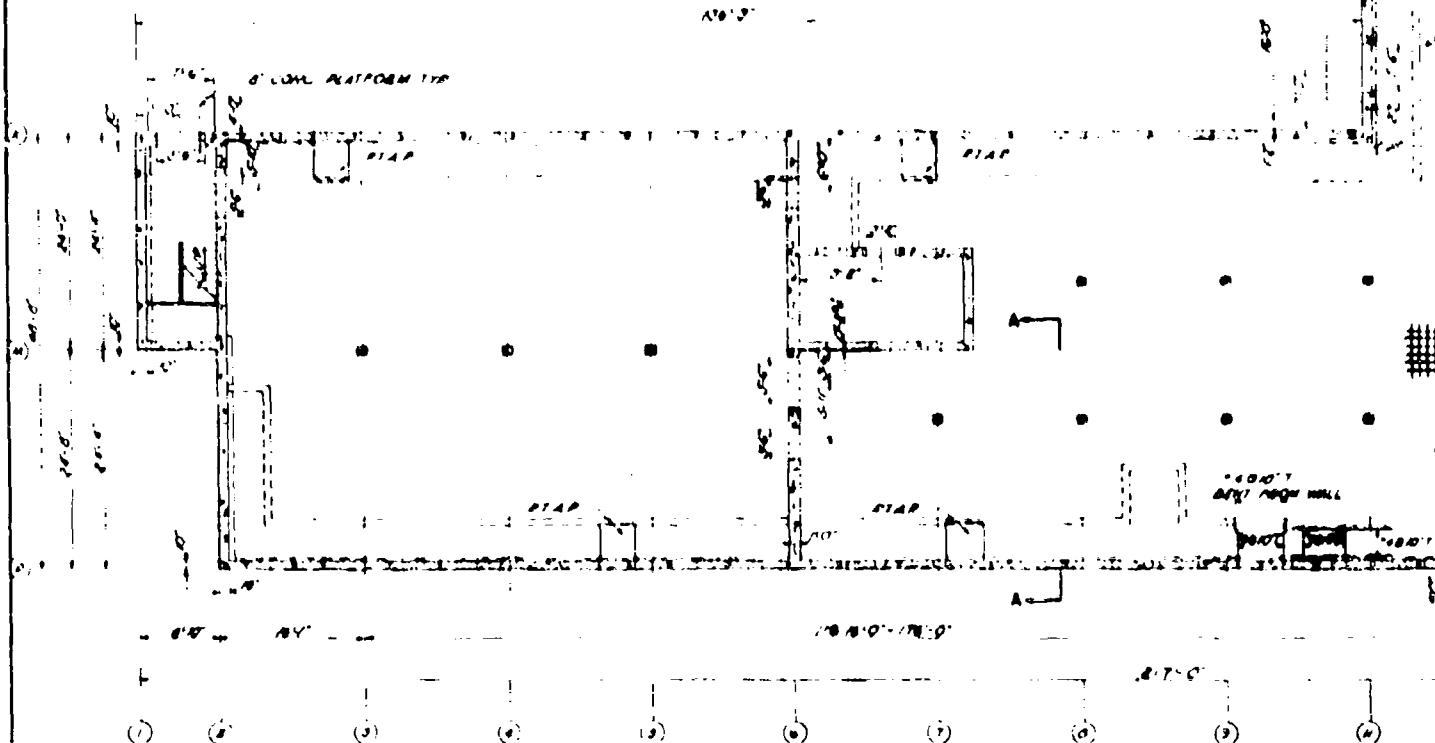
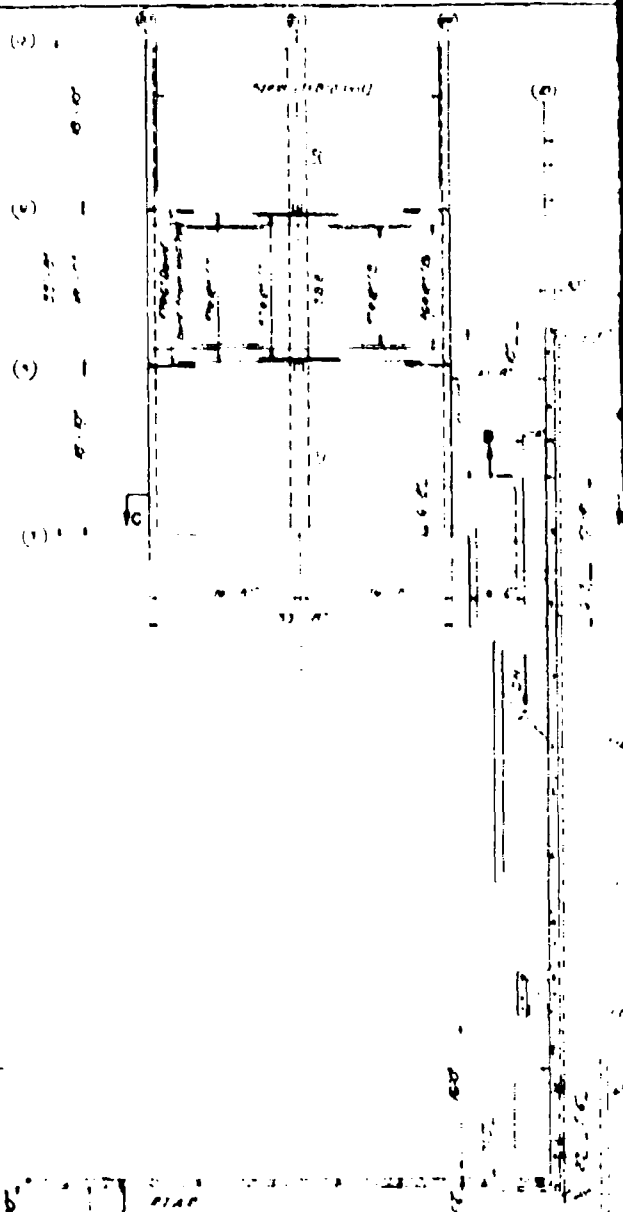




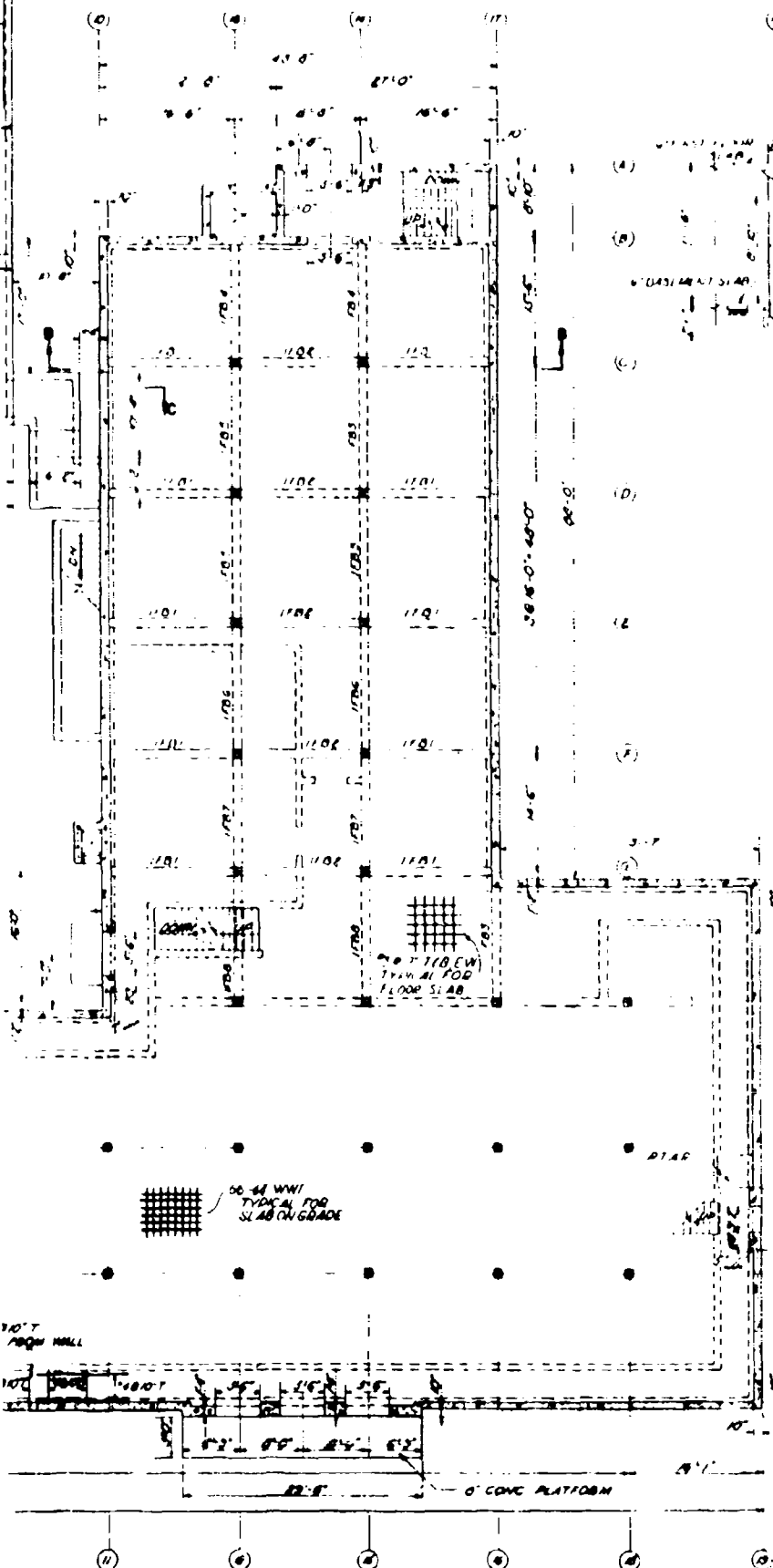
FRAMING DETAIL AT MAIN ENTRANCE  
SCALE: 1/4" = 1'-0"

TEAM SCHEDULE							
DATE	TIME	HOME	AWAY	DATE	TIME	HOME	AWAY
1/1	1:00	1	2	1/1	1:00	1	2
1/2	1:00	1	2	1/2	1:00	1	2
1/3	1:00	1	2	1/3	1:00	1	2
1/4	1:00	1	2	1/4	1:00	1	2
1/5	1:00	1	2	1/5	1:00	1	2
1/6	1:00	1	2	1/6	1:00	1	2
1/7	1:00	1	2	1/7	1:00	1	2
1/8	1:00	1	2	1/8	1:00	1	2
1/9	1:00	1	2	1/9	1:00	1	2
1/10	1:00	1	2	1/10	1:00	1	2
1/11	1:00	1	2	1/11	1:00	1	2
1/12	1:00	1	2	1/12	1:00	1	2
1/13	1:00	1	2	1/13	1:00	1	2
1/14	1:00	1	2	1/14	1:00	1	2
1/15	1:00	1	2	1/15	1:00	1	2
1/16	1:00	1	2	1/16	1:00	1	2
1/17	1:00	1	2	1/17	1:00	1	2
1/18	1:00	1	2	1/18	1:00	1	2
1/19	1:00	1	2	1/19	1:00	1	2
1/20	1:00	1	2	1/20	1:00	1	2
1/21	1:00	1	2	1/21	1:00	1	2
1/22	1:00	1	2	1/22	1:00	1	2
1/23	1:00	1	2	1/23	1:00	1	2
1/24	1:00	1	2	1/24	1:00	1	2
1/25	1:00	1	2	1/25	1:00	1	2
1/26	1:00	1	2	1/26	1:00	1	2
1/27	1:00	1	2	1/27	1:00	1	2
1/28	1:00	1	2	1/28	1:00	1	2
1/29	1:00	1	2	1/29	1:00	1	2
1/30	1:00	1	2	1/30	1:00	1	2
1/31	1:00	1	2	1/31	1:00	1	2

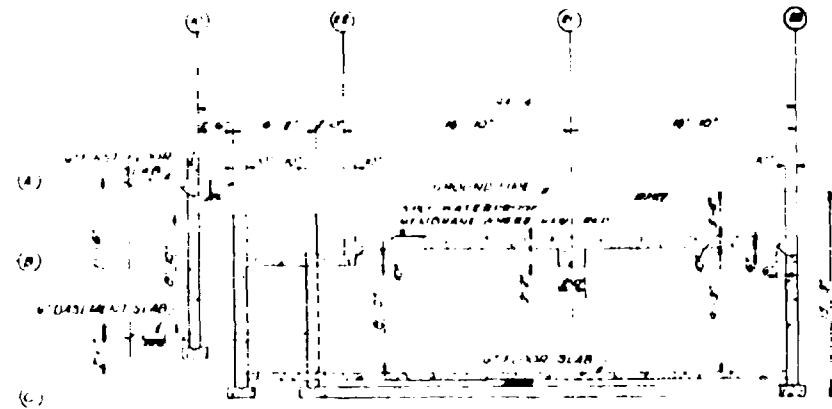
File No. 8-4-13 116 95001 47



**FIRST FLOOR AND SHELTER ROOF FRAMING PLAN**  
SCALE 1/4" = 1' 0"



XOF FRAMING PLAN

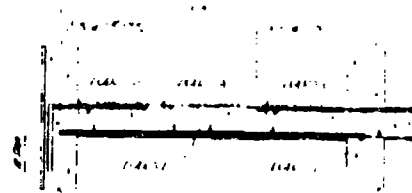


SECTION C-C  
SCALE 1/4" = 1'-0"

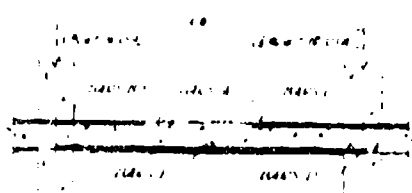
AMMANN & WHITNEY CONSULTING ENGINEERS 111 5TH AVENUE NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.	
PROJECT NO. DRAWING NO. DATE BY CHECKED APPROVED DATE BY		PROTECTIVE CONSTRUCTION ADMINISTRATION BUILDING 10 PSI BLAST RESISTANT AS NOTED 60-13-01 SHEET 2 OF 2	

Beam No.	W	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
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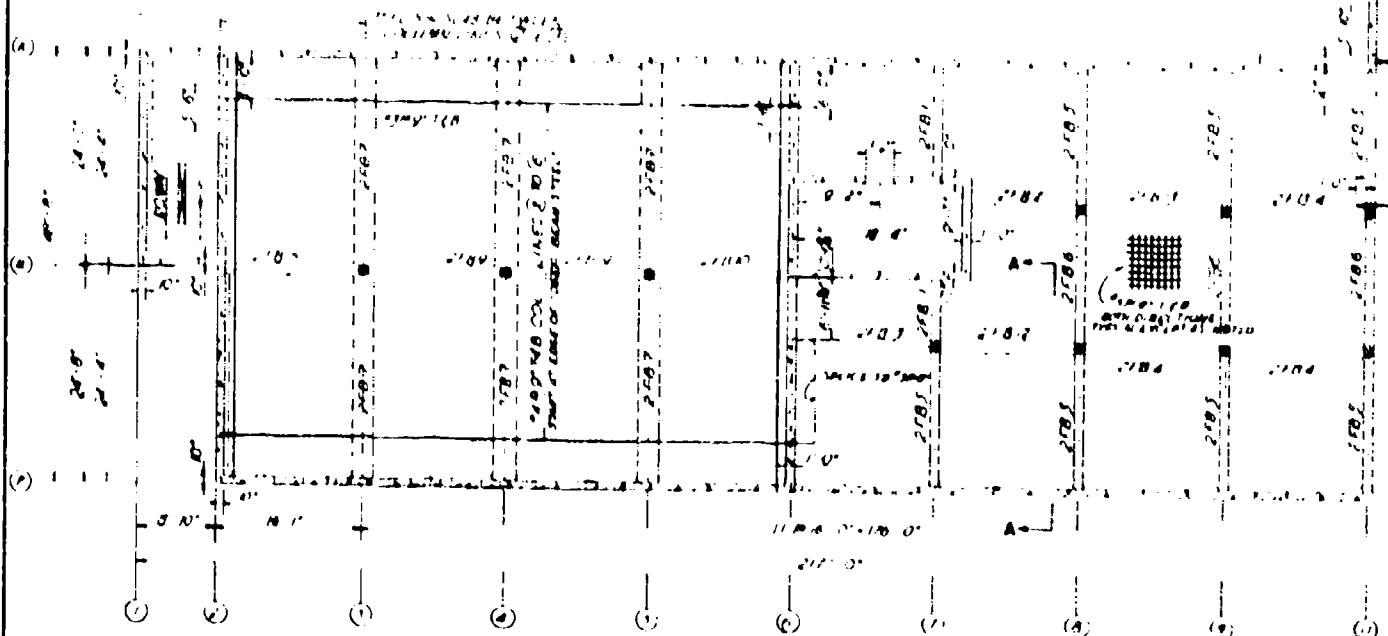
TYPICAL EXTERIOR BEAM DETAILS



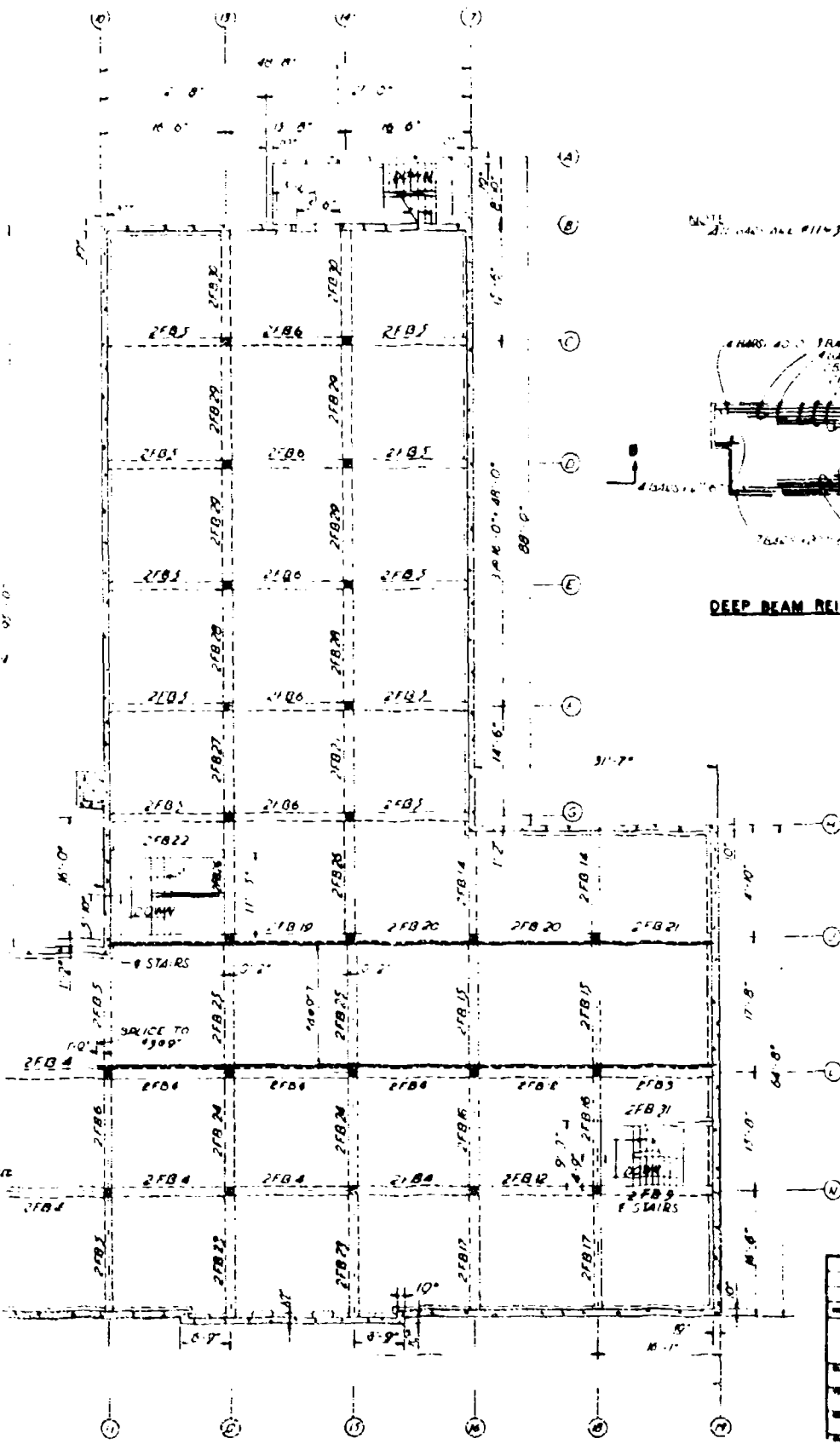
TYPICAL INTERIOR BEAM DETAILS

NOTE

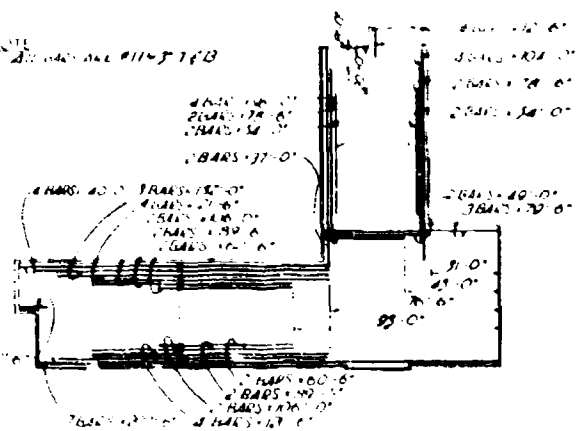
ALL BEAMS SHALL BE 24 IN. WIDE AND 24 IN. DEEP  
UNLESS OTHERWISE SPECIFIED IN THE DRAWING



SECOND FLOOR FRAMING PLAN



NOTE: SEE DRAWING #114-5718



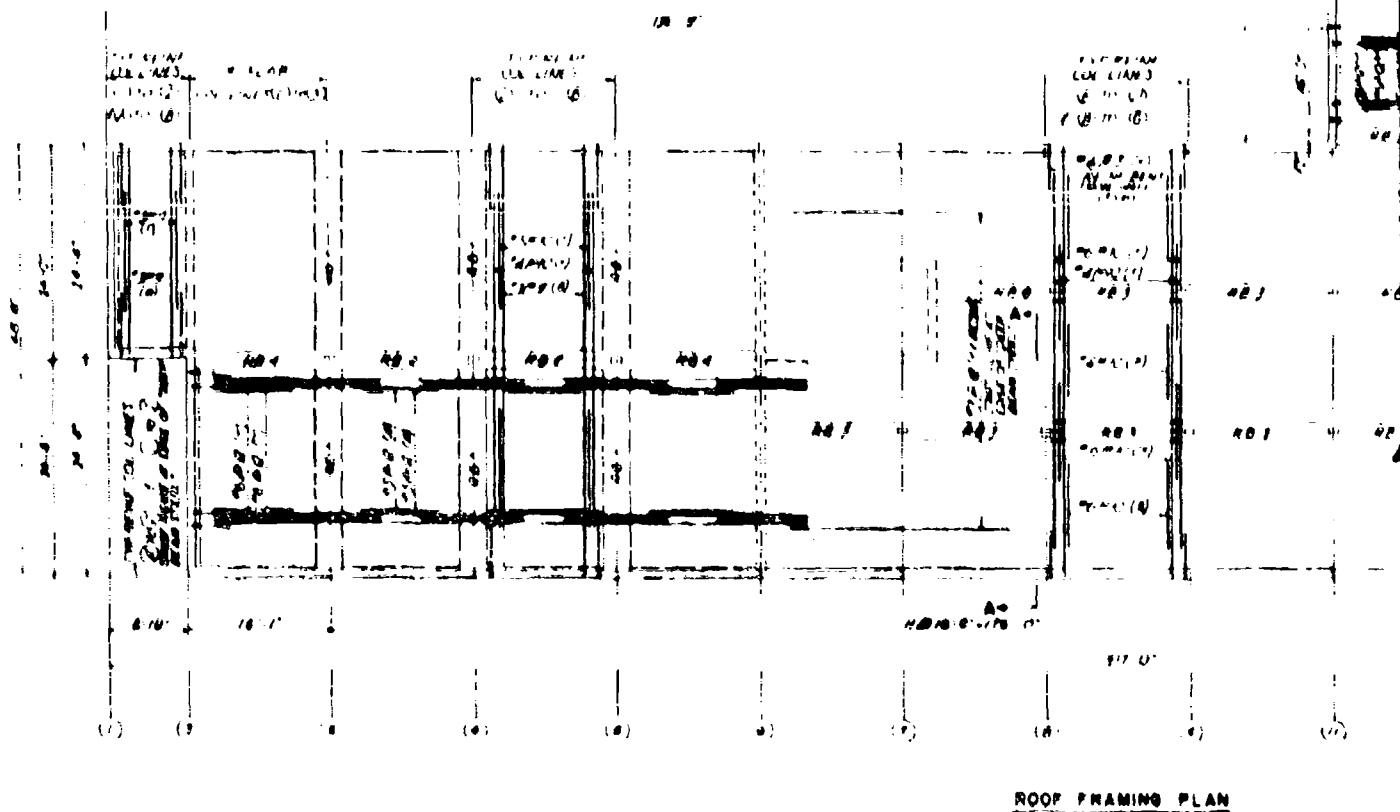
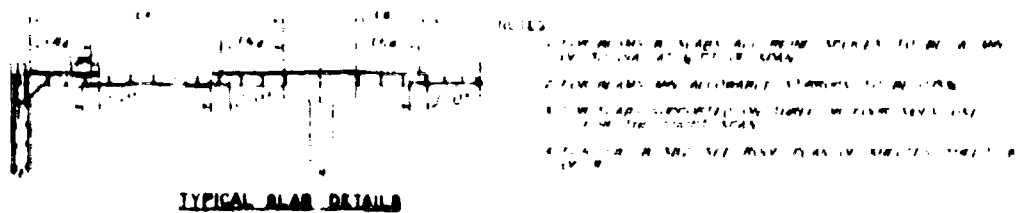
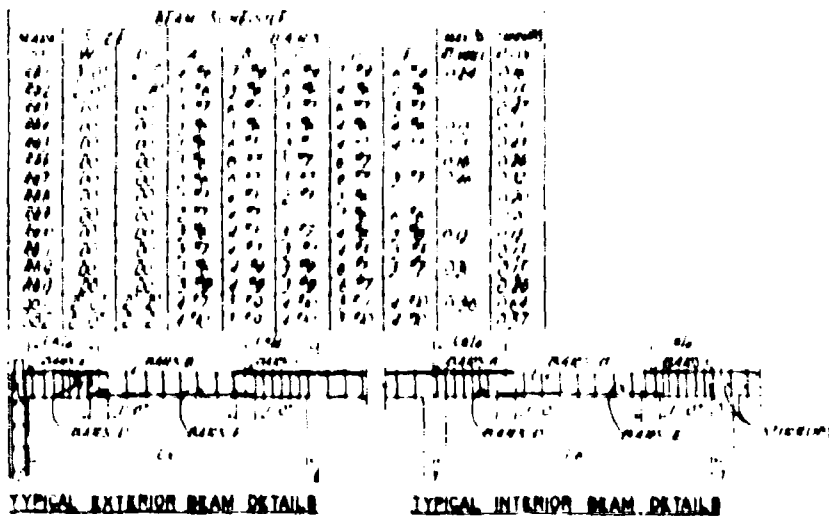
**DEEP BEAM REINFORCEMENT - SECOND FLOOR**

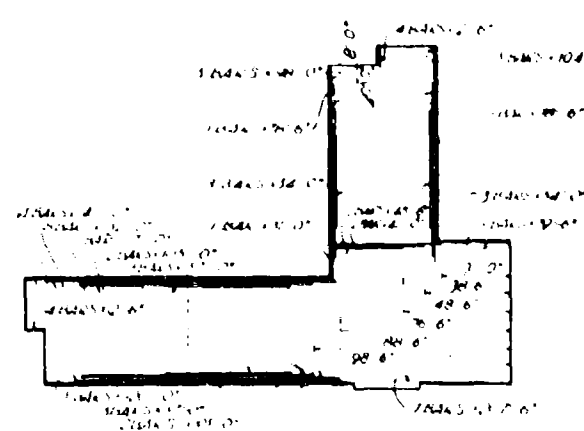
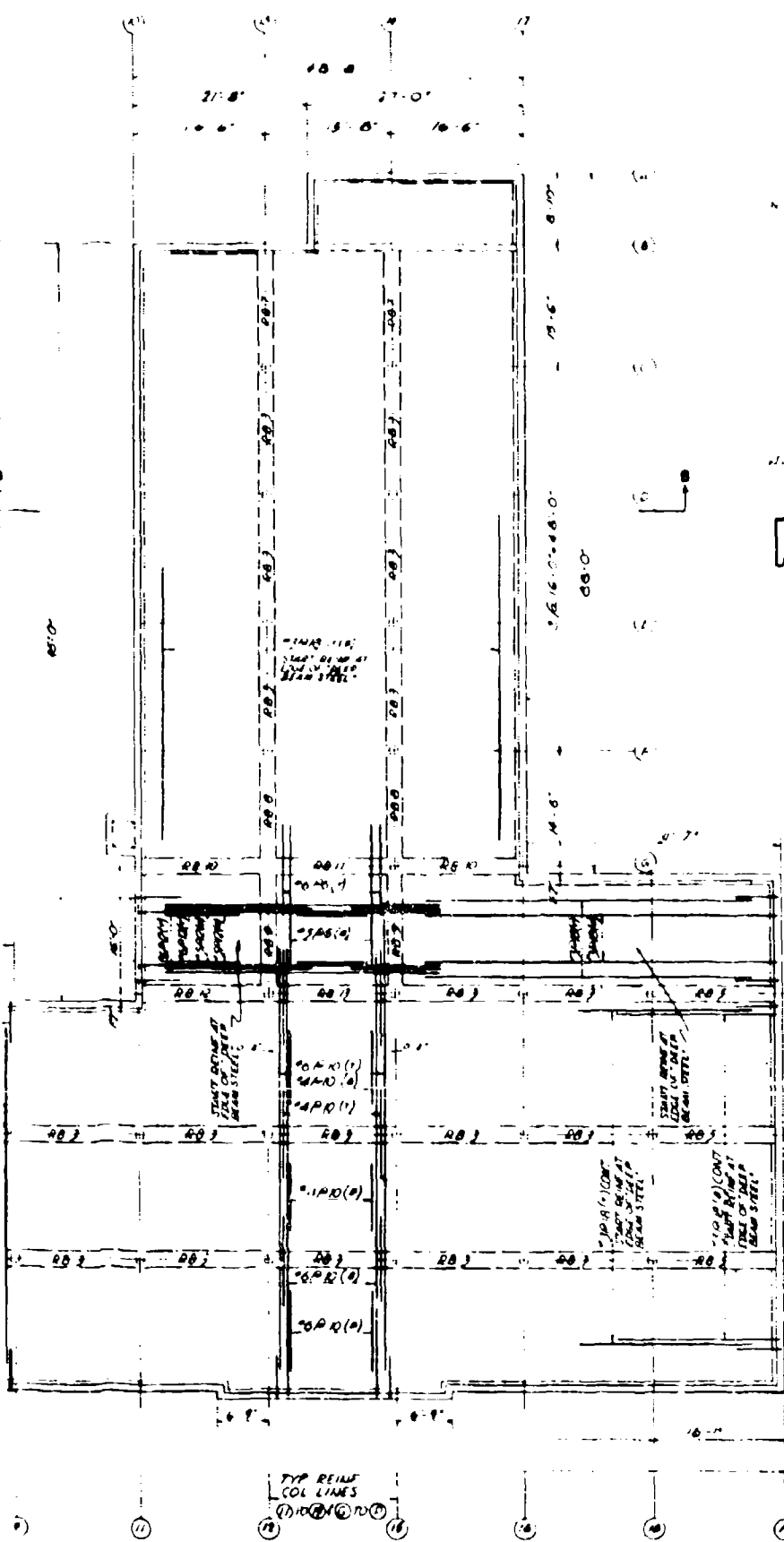
NOTE: SECOND FLOOR SLAB REINPT AS NOTED

LINE PLAN

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<b>AMMANN &amp; WHITNEY</b> CONSULTING ENGINEERS 111-8TH AVENUE, NEW YORK, N. Y.		<b>DEPARTMENT OF THE ARMY</b> OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.	
DRAWN BY: F. W. CHECKED BY: G. P. DESIGNED BY: J. H. DATE: MAY 1952		<b>PROTECTIVE CONSTRUCTION</b> <b>ADMINISTRATION BUILDING</b> <b>10 PSI BLAST RESISTANT</b>	
PROJECT NO. 80-18-0		SHEET 7 OF 8	



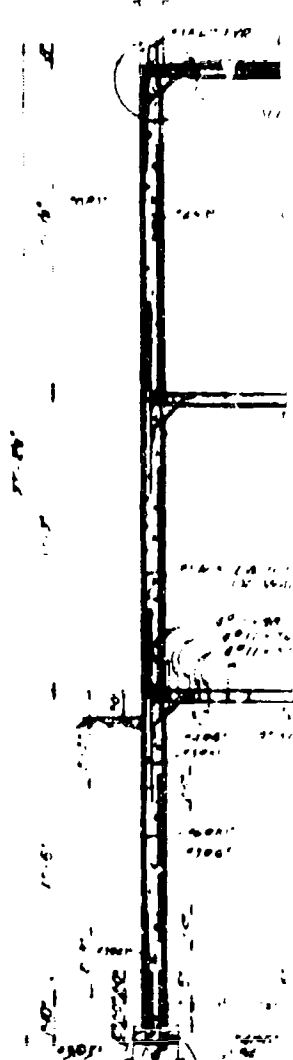


DEEP BEAM REINFORCEMENT - ROOF

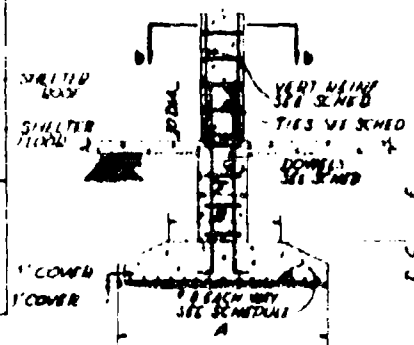
NOTE: ROOF SLAB 1" EXCEPT AS NOTED

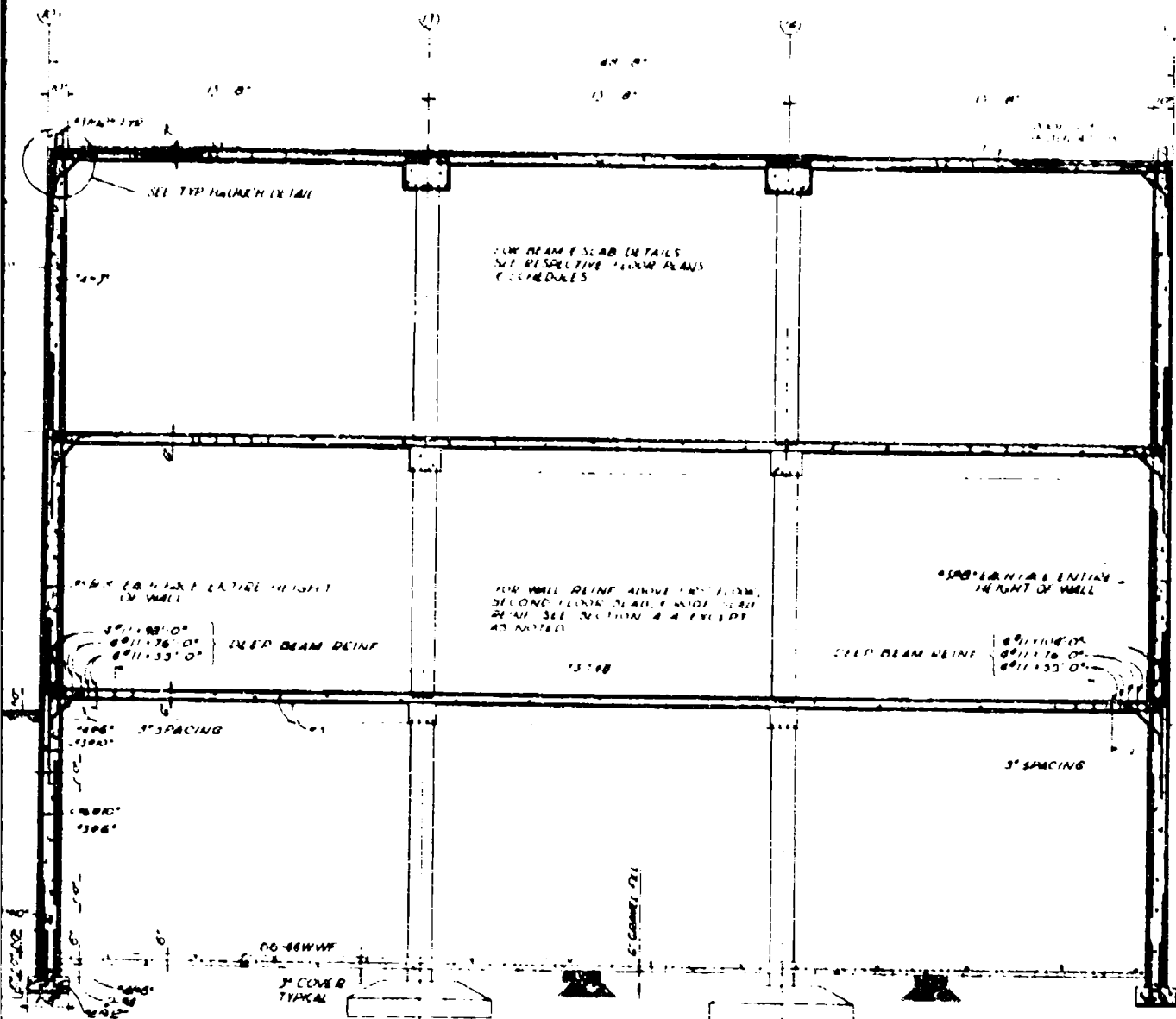
PLAN

AMMANN & WISTNET CONSULTING ENGINEERS 111 EYE AVENUE, NEW YORK, N. Y.		DEPARTMENT OF THE OFFICE OF THE CHIEF OF BOMB BOMBARDMENT CONTROL WASHINGTON, D. C.	
PROJECT NO. DRAWING NO. DATE		PROJECT NO. DRAWING NO. DATE	
PROTECTIVE CONSTRUCTION ADMINISTRATION BUILDING 10 FBI BLAST RESISTANT		DRAWING NUMBER 60-16-01	



### TYPICAL COLUMN FOOTING

[illegible]



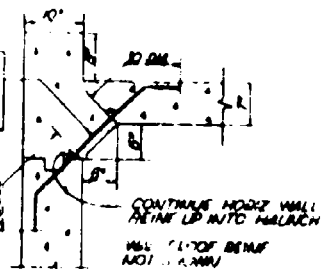
**SECTION B-B**  
SCALE: 1/4" = 1'-0"



**SECTION B-B**

VERT. REIN. SEE SCHED.  
TIES SEE SCHED.  
DOVELES SEE SCHED.

HATCH REIN. TO BE SAME SIZE AS REIN. IN ROOF SLAB



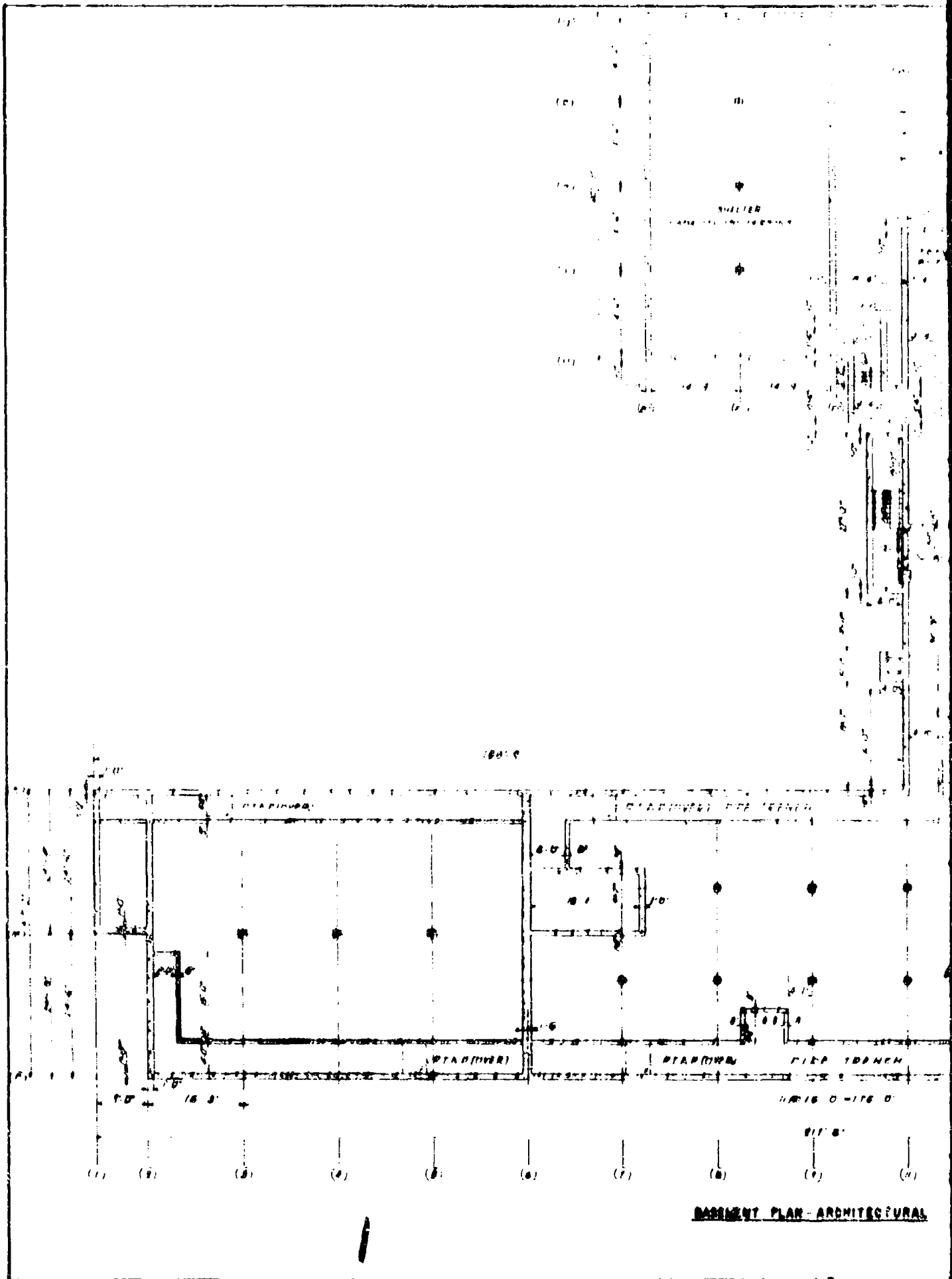
**TYPICAL HATCH DETAIL**  
SCALE: 1/4" = 1'-0"

NOTE: CONCRETE COVER TO REINFORCEMENT BARS IS AS FOLLOWS EXCEPT AS NOTED:  
BEAMS 4"  
SLABS 2"  
EXT. WALLS 4" INSIDE FACE  
INT. WALLS 2" OUTSIDE FACE

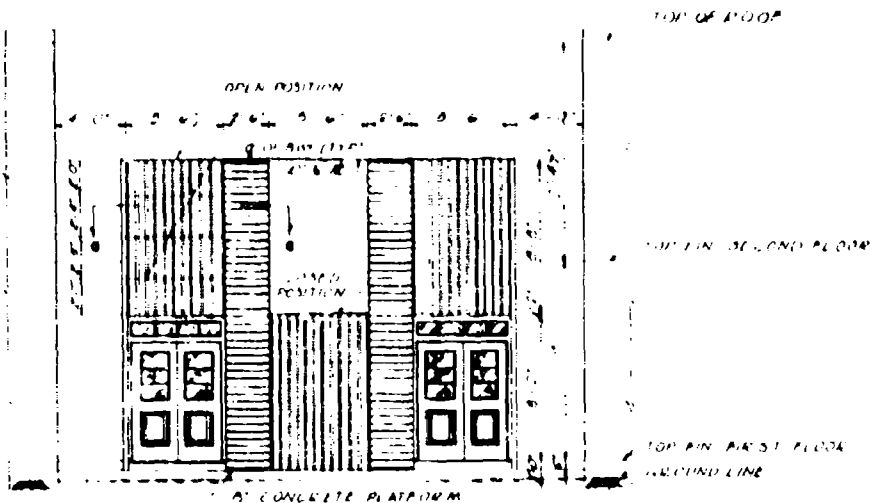
AMMANN & WHITNEY 111.0th AVENUE, NEW YORK, N. Y.		DEPARTMENT OF THE ARMY MILITARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.	
PROJECT NO. 60-10-01		PROJECT NO. 60-10-01	
PROTECTIVE CONSTRUCTION ADMINISTRATION BUILDING 10 PSI BLAST RESISTANT		PROTECTIVE CONSTRUCTION ADMINISTRATION BUILDING 10 PSI BLAST RESISTANT	
DESIGNED BY: [Signature]		DESIGNED BY: [Signature]	
CHECKED BY: [Signature]		CHECKED BY: [Signature]	
DATE: 10-1-58		DATE: 10-1-58	
SCALE: 1/4" = 1'-0"		SCALE: 1/4" = 1'-0"	

2

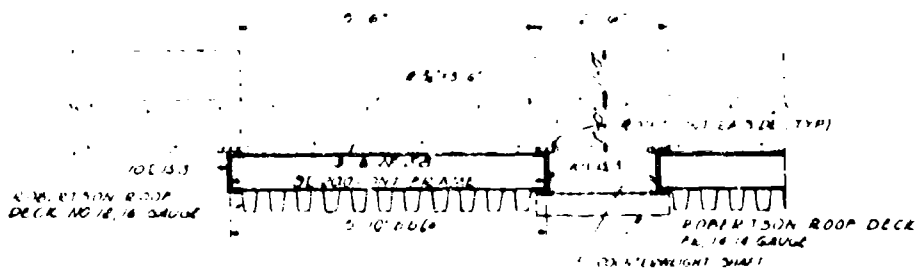




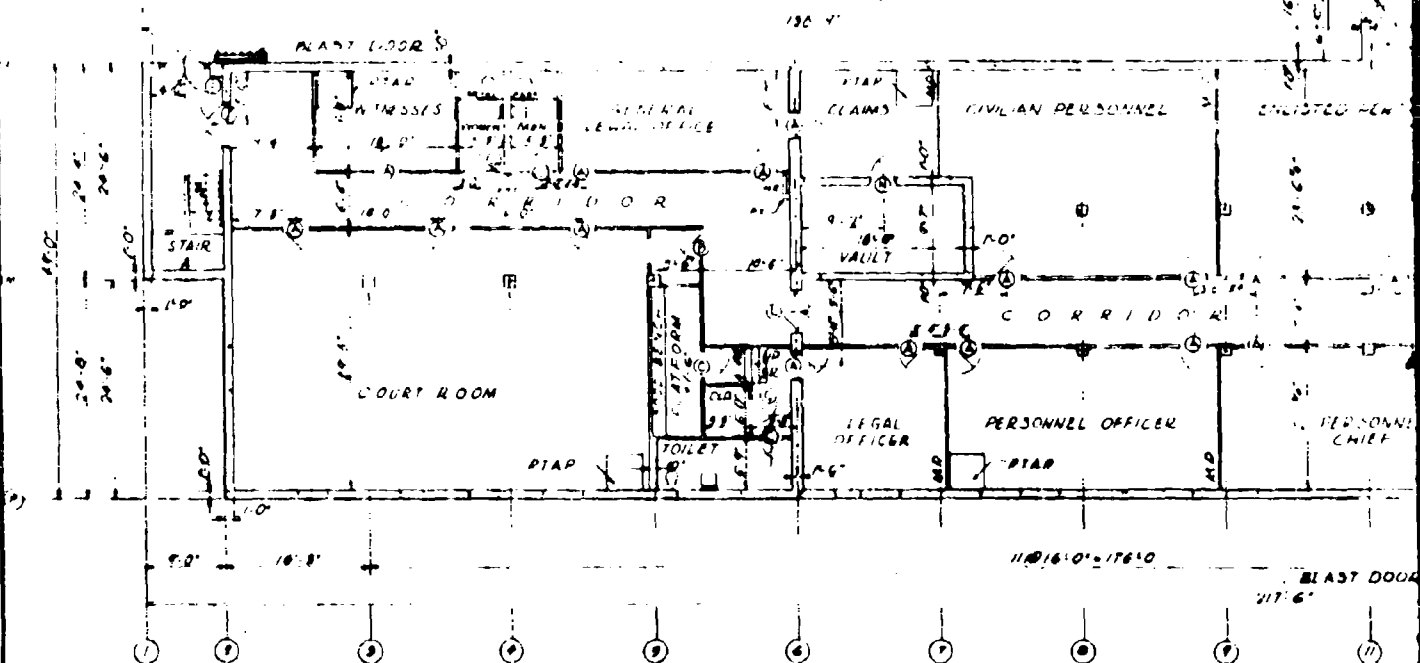




ELEVATION OF MAIN DOORS  
SCALE 1/4" = 1'-0"



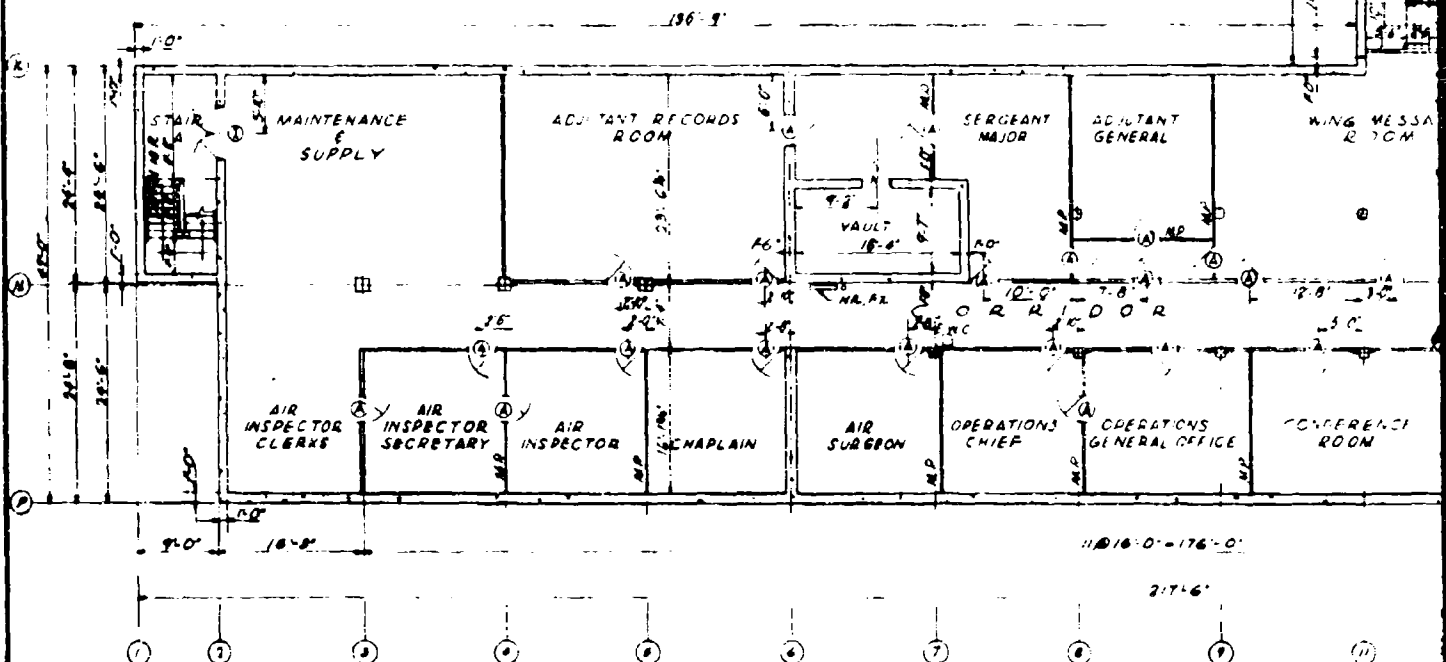
SECTION 8-8  
SCALE 1/4" = 1'-0"



FIRST FLOOR PLAN - ARCHITECTURAL  
SCALE 1/4" = 1'-0"

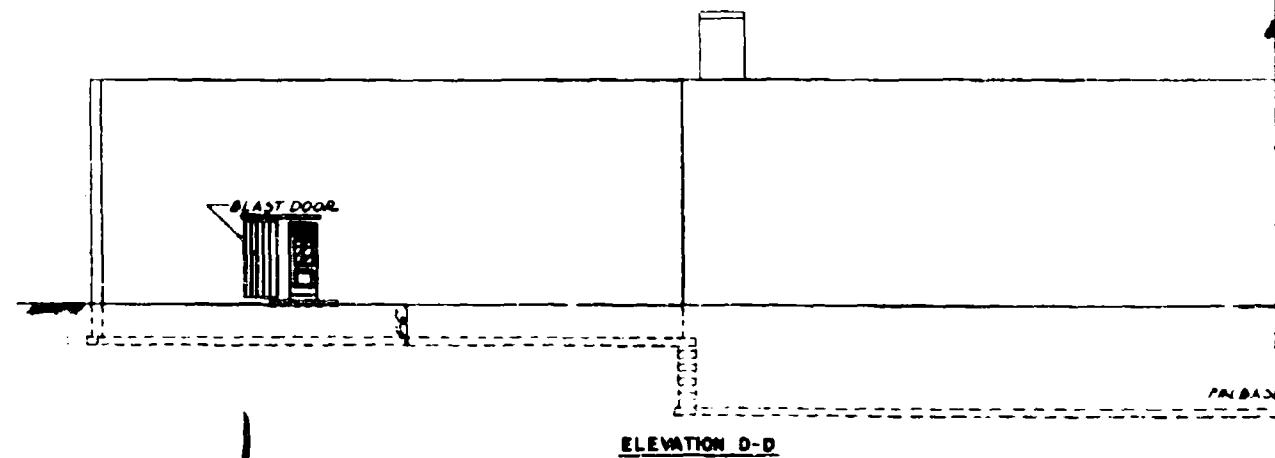
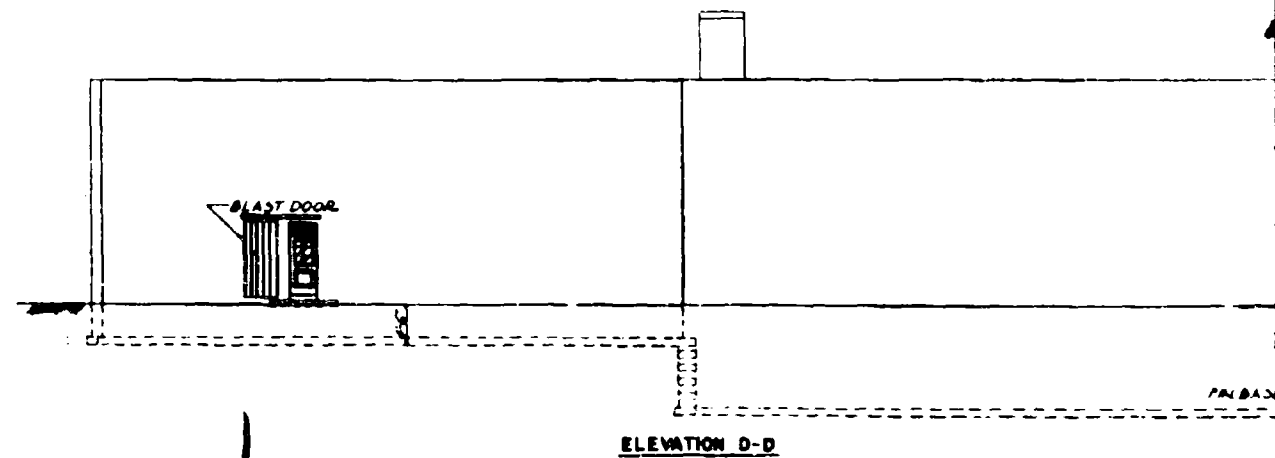
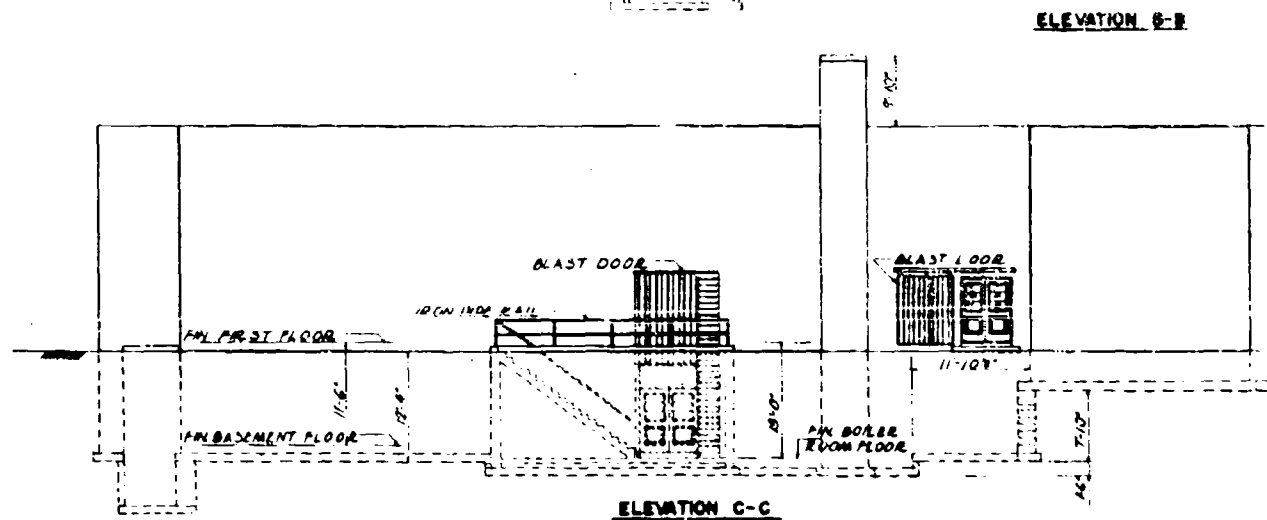
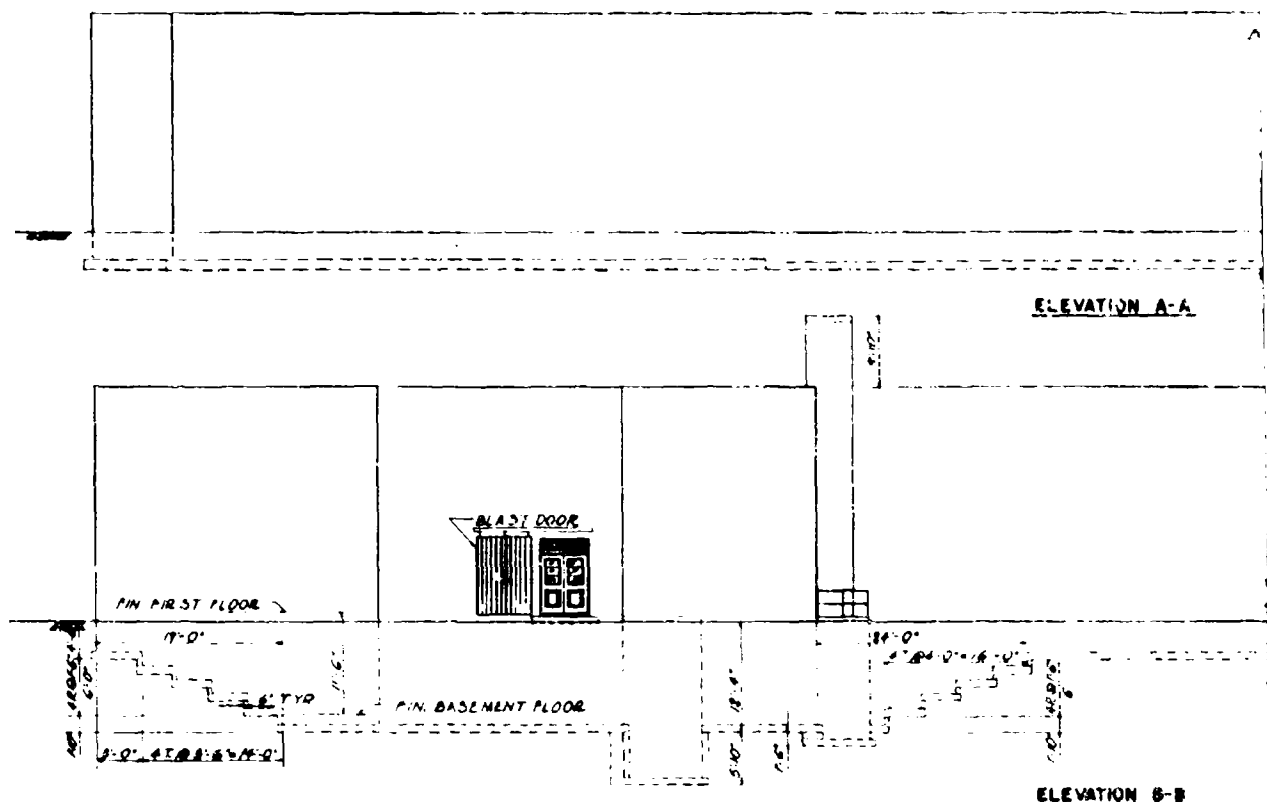


DOOR SCHEDULE			
NO.	MATERIAL	SIZE	GLASS
INTERIOR			
A	WOOD	5'-0" x 6'-8" x 1/2"	CLEAR
E	WOOD	7'-8" x 6'-8" x 1/2"	
C	WOOD	7'-6" x 6'-8" x 1/2"	
D	KALAMEIN	5'-0" x 6'-8" x 1/2"	CLEAR WIRE
F	WOOD	7'-8" x 6'-8" x 1/2"	CLEAR
G	WOOD	7'-6" x 6'-8" x 1/2"	CLEAR
H	WOOD	5'-0" x 6'-8" x 1/2"	CLEAR
I	KALAMEIN	5'-0" x 6'-8" x 1/2"	CLEAR WIRE
K	KALAMEIN	5'-0" x 6'-8" x 1/2"	
L	WOOD	5'-0" x 6'-8" x 1/2"	CLEAR WIRE
M	TIN CLAD	5'-0" x 6'-8" x 1/2"	
N	METAL	7'-8" x 6'-8"	
O	KALAMEIN	5'-0" x 6'-8" x 1/2"	
EXTERIOR			
1	WOOD	5'-0" x 6'-8" x 1/2"	CLEAR
2	WOOD	7'-8" x 6'-8" x 1/2"	CLEAR
3	WOOD	6'-0" x 7'-0" x 1/2"	CLEAR WIRE
4	WOOD	9'-0" x 7'-0" x 1/2"	CLEAR



SECOND FLOOR PLAN





WALL DOORS



TOP OF ROOF

PN SECOND FLOOR

PN FIRST FLOOR

GROUND LINE

ELEVATION A-A

TOP OF ROOF

PN SECOND FLOOR

WALL DOORS

PN FIRST FLOOR

GROUND LINE

ELEVATION B-B

TOP OF ROOF

PN SECOND FLOOR

PN FIRST FLOOR

GROUND LINE

TOP OF ROOF

PN SECOND FLOOR

PN FIRST FLOOR

GROUND LINE

PN BASEMENT FLOOR

A-C

D-A

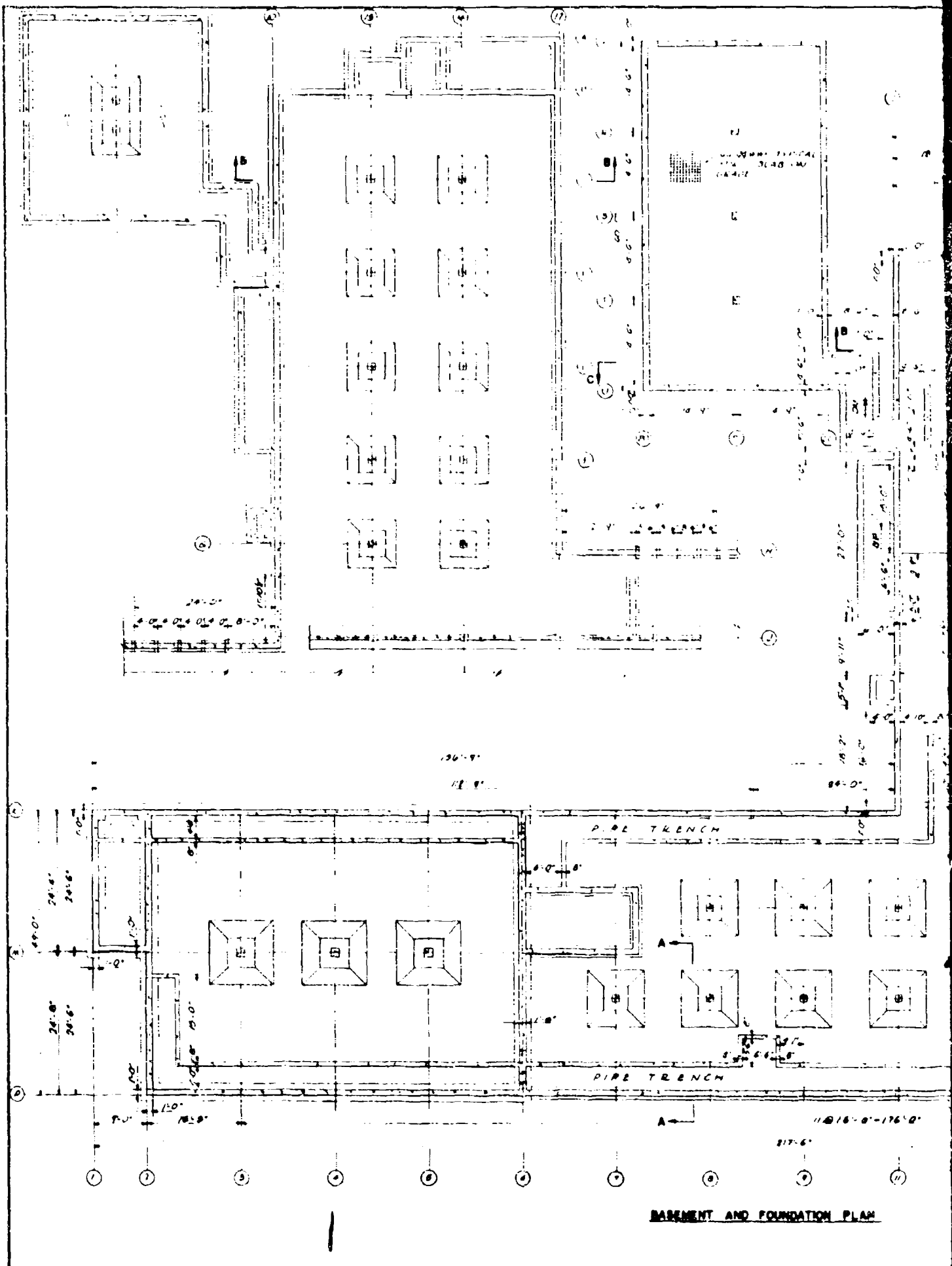
A-C

D-A

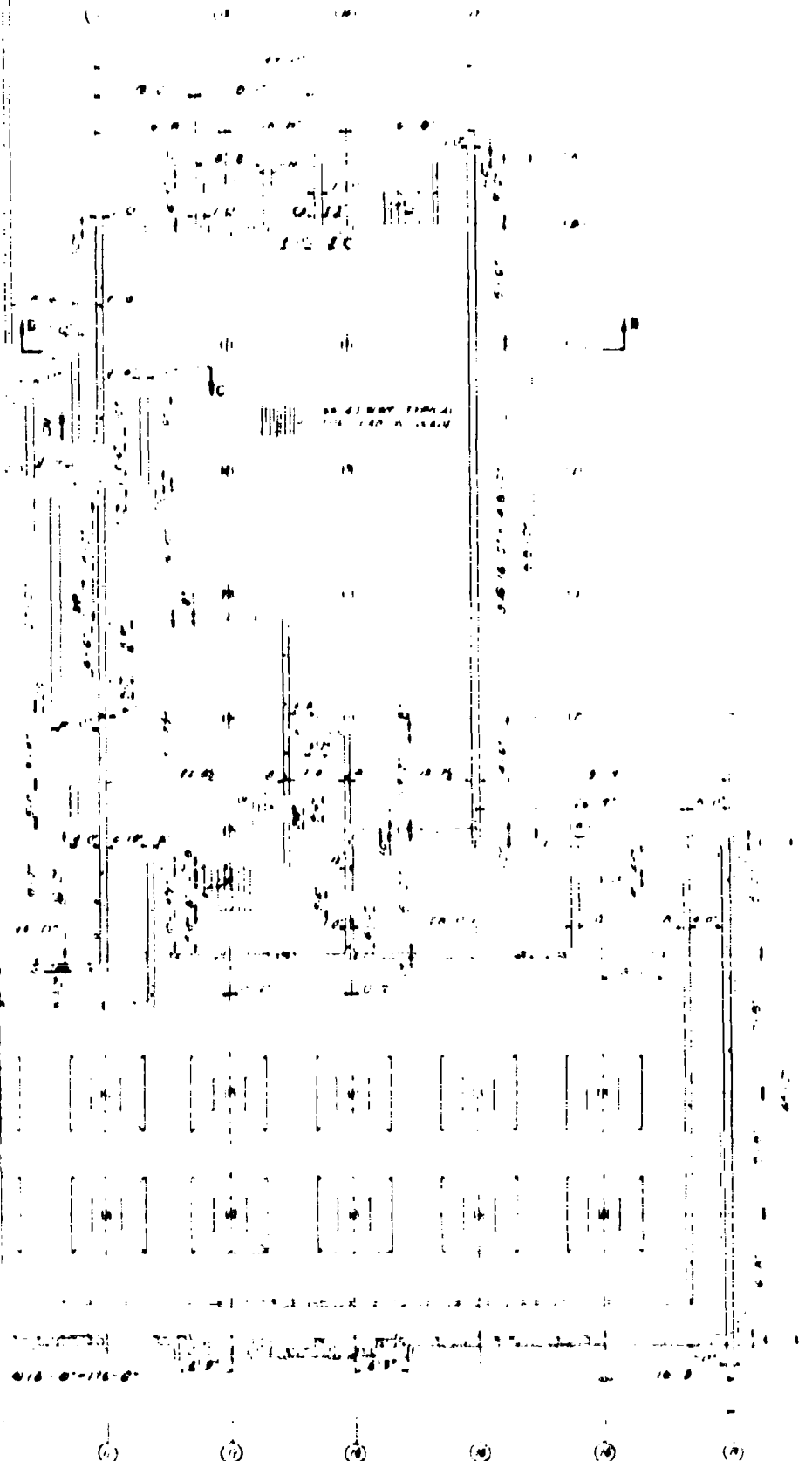
2

<b>ARMANN &amp; WHITNEY</b> 111 5TH AVENUE NEW YORK, N. Y.		<b>DEPARTMENT OF THE ARMY</b> HEADQUARTERS WASHINGTON, D. C.	
DRAWN BY P. H.		<b>PROTECTIVE CONSTRUCTION</b> <b>ADMINISTRATION BUILDING</b> <b>SO PM BLAST RESISTANT</b>	
CHECKED BY J. H.		DATE 10-16-01	
APPROVED BY J. H.		PROJECT NO. 10-16-01	
SCALE 1/4" = 1'-0"		SHEET NO. 10-16-01	





BASEMENT AND FOUNDATION PLAN



PLAN

2

AMMANN & WHITNEY 111 5TH AVENUE NEW YORK N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION DIVISION WASHINGTON, D. C.	
DRAWN BY CHECKED BY APPROVED BY DATE		PROJECT NO. SHEET NO.	
<p align="center"><b>PROTECTIVE CONSTRUCTION ADMINISTRATION BUILDING 20 PSI BLAST RESISTANT</b></p>			
DATE		SCALE	

FIRST FLOOR AND SHELTER ROOF FRAMING PLAN  
SCALE 3/4" = 1'-0"

SECTION C C  
GRADE 11

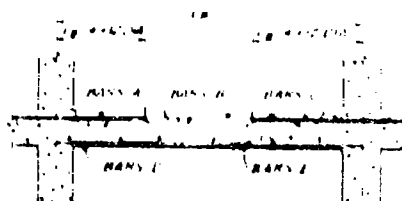
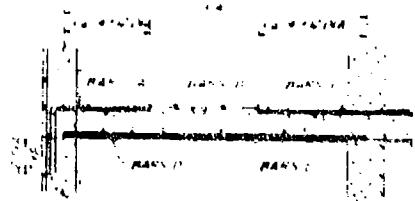
5 CONT. 17 APR 1968 AM

### FRAMING PLAN

AMMANN & WHITNEY  
1000 10th Avenue, New York 14, N.Y.  
THE DEPARTMENT OF THE ARMY  
ATTN: Mr. H. H. H. H. H.  
WASHINGTON, D.C. 20315  
PROTECTIVE CONSTRUCTION  
ADMINISTRATION BUILDING  
20 PSI BLAST RESISTANT.

H I A M SCHEDULE						
MARK NO.	A	B	C	D	E	F
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MATER		RE AM SCHEDULE						
NO.	DATE	W	T	W	TH	F	S	S
2000	10/1							
2001	10/2							
2002	10/3							
2003	10/4							
2004	10/5							
2005	10/6							
2006	10/7							
2007	10/8							
2008	10/9							
2009	10/10							
2010	10/11							
2011	10/12							
2012	10/13							
2013	10/14							
2014	10/15							
2015	10/16							
2016	10/17							
2017	10/18							
2018	10/19							
2019	10/20							
2020	10/21							
2021	10/22							
2022	10/23							
2023	10/24							
2024	10/25							
2025	10/26							
2026	10/27							
2027	10/28							
2028	10/29							
2029	10/30							
2030	10/31							



### TYPICAL EXTERIOR BEAM DETAILS

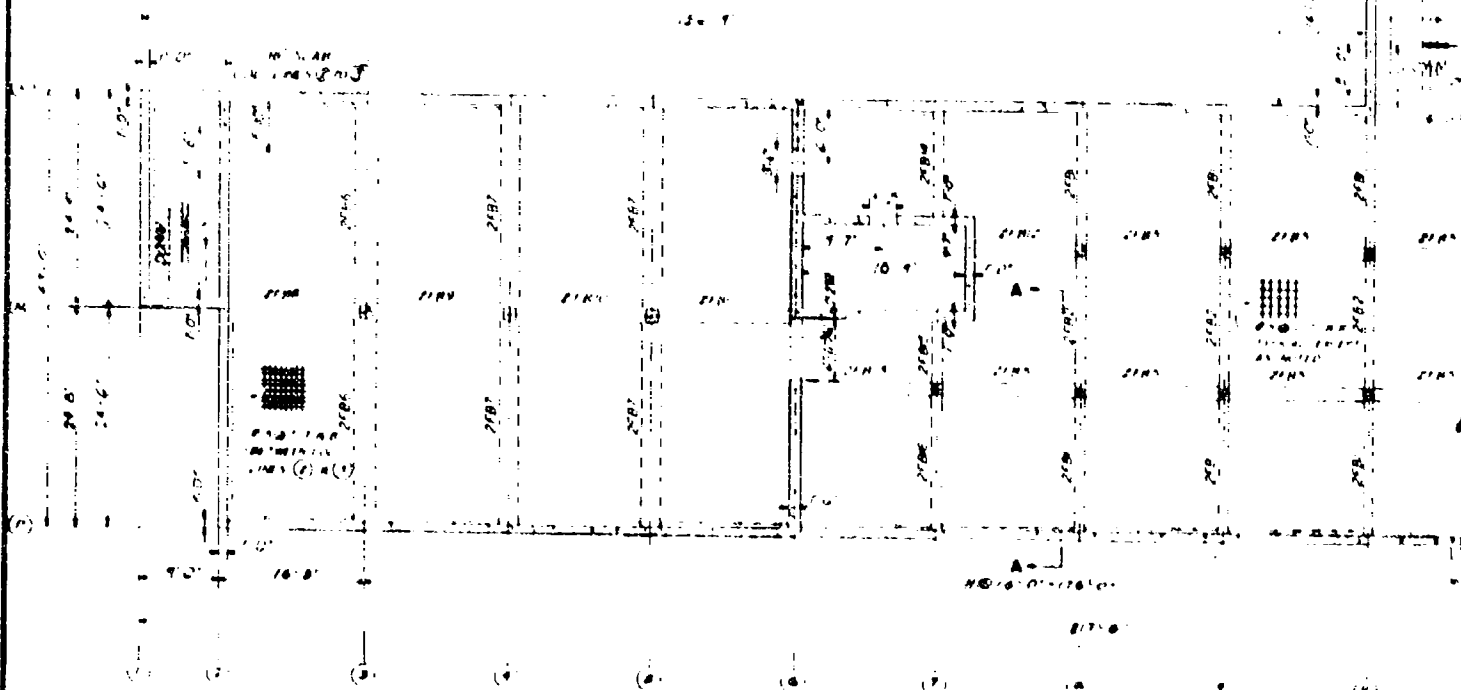
### TYPICAL INTERIOR BEAM DETAILS

NO. 1

ALL STORIES TO BE A COPY OF 12 MAR 1955  
WENT TO THE NAVY AT 6 PM SING AND RUTHER  
MAY AT 6 PM 1955

STATE OF NEW YORK  
IN SENATE  
JANUARY 11, 1906.

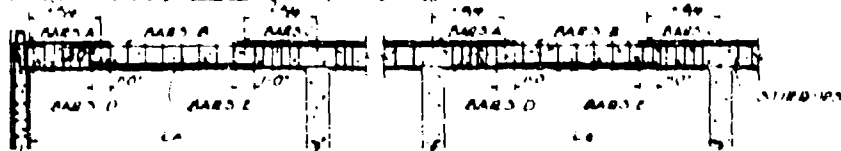
1918 - 1919



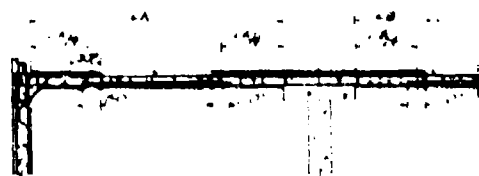
SECOND FLOOR FRAMING PLAN



BEAM SCHEDULE									
BAR NO.	SIZE	D	A	B	C	D	E	BAR NO. AT WALL	BAR NO. AT COL
101	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	101	101
102	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	102	102
103	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	103	103
104	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	104	104
105	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	105	105
106	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	106	106
107	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	107	107
108	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	108	108
109	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	109	109
110	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	110	110
111	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	111	111
112	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	112	112
113	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	113	113
114	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	114	114
115	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	115	115
116	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	116	116
117	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	117	117
118	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	118	118
119	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	119	119
120	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	120	120
121	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	121	121
122	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	122	122
123	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	123	123
124	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	124	124
125	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	125	125
126	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	126	126
127	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	127	127
128	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	128	128
129	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	129	129
130	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	130	130
131	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	131	131
132	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	132	132
133	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	133	133
134	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	134	134
135	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	135	135
136	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	136	136
137	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	137	137
138	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	138	138
139	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	139	139
140	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	140	140
141	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	141	141
142	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	142	142
143	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	143	143
144	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	144	144
145	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	145	145
146	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	146	146
147	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	147	147
148	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	148	148
149	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	149	149
150	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	150	150
151	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	151	151
152	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	152	152
153	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	153	153
154	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	154	154
155	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	155	155
156	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	156	156
157	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	157	157
158	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	158	158
159	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	159	159
160	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	160	160
161	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	161	161
162	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	162	162
163	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	163	163
164	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	164	164
165	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	165	165
166	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	166	166
167	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	167	167
168	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	168	168
169	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	169	169
170	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	170	170
171	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	171	171
172	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	172	172
173	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	173	173
174	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	174	174
175	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	175	175
176	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	176	176
177	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	177	177
178	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	178	178
179	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	179	179
180	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	180	180
181	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	181	181
182	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	182	182
183	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	183	183
184	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	184	184
185	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	185	185
186	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	186	186
187	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	187	187
188	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	188	188
189	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	189	189
190	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	190	190
191	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	191	191
192	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	192	192
193	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	193	193
194	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	194	194
195	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	195	195
196	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	196	196
197	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	197	197
198	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	198	198
199	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	199	199
200	1/2"	12"	1/2"	1/2"	1/2"	1/2"	1/2"	200	200



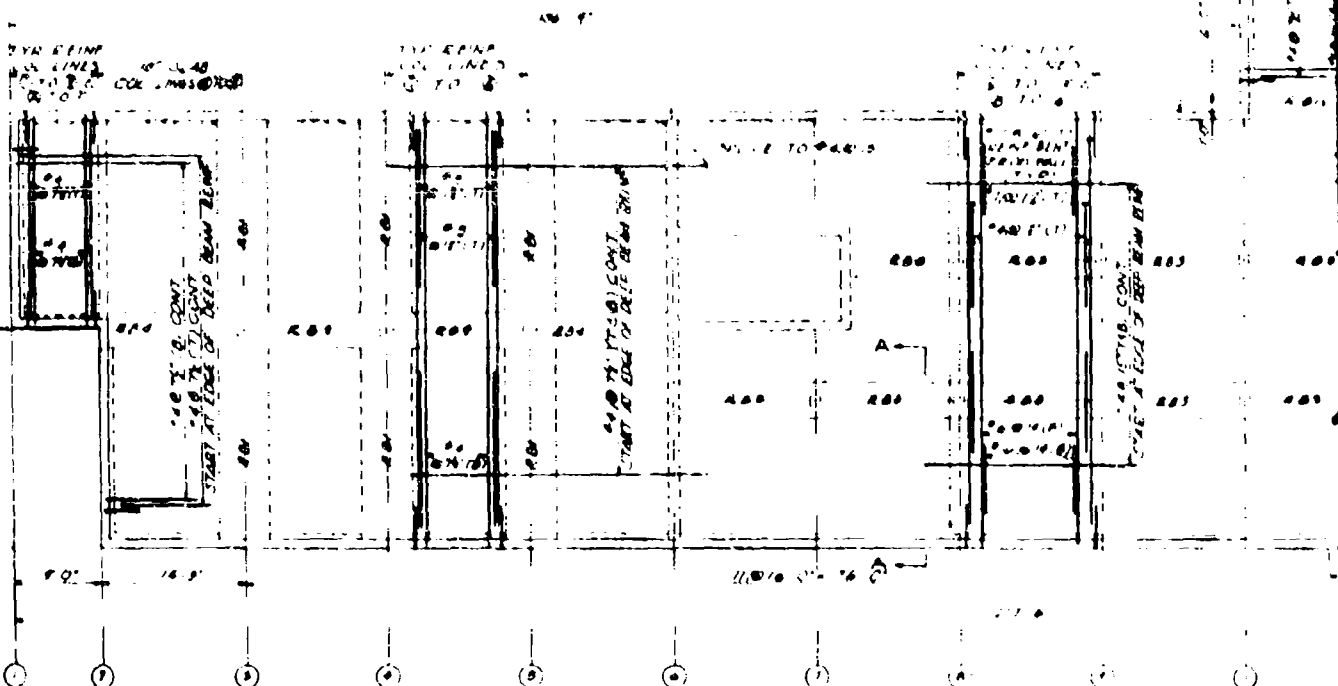
TYPICAL EXTERIOR BEAM DETAILS TYPICAL INTERIOR BEAM DETAILS



TYPICAL SLAB DETAILS

NOTES

1. FOR BEAMS & SLABS ALL REINFORCEMENT TO BE AS SHOWN IN SECTION AT BOTTOM OF DRAWING.
2. FOR BEAMS AND SLABS ALL REINFORCEMENT TO BE AS SHOWN.
3. FOR SLABS SUPPORTED ON THREE OR FOUR SIDES, USE L FOR THE SHORT SPAN.
4. FOR SLABS SUPPORTED ON TWO SIDES, USE L FOR THE SHORT SPAN.

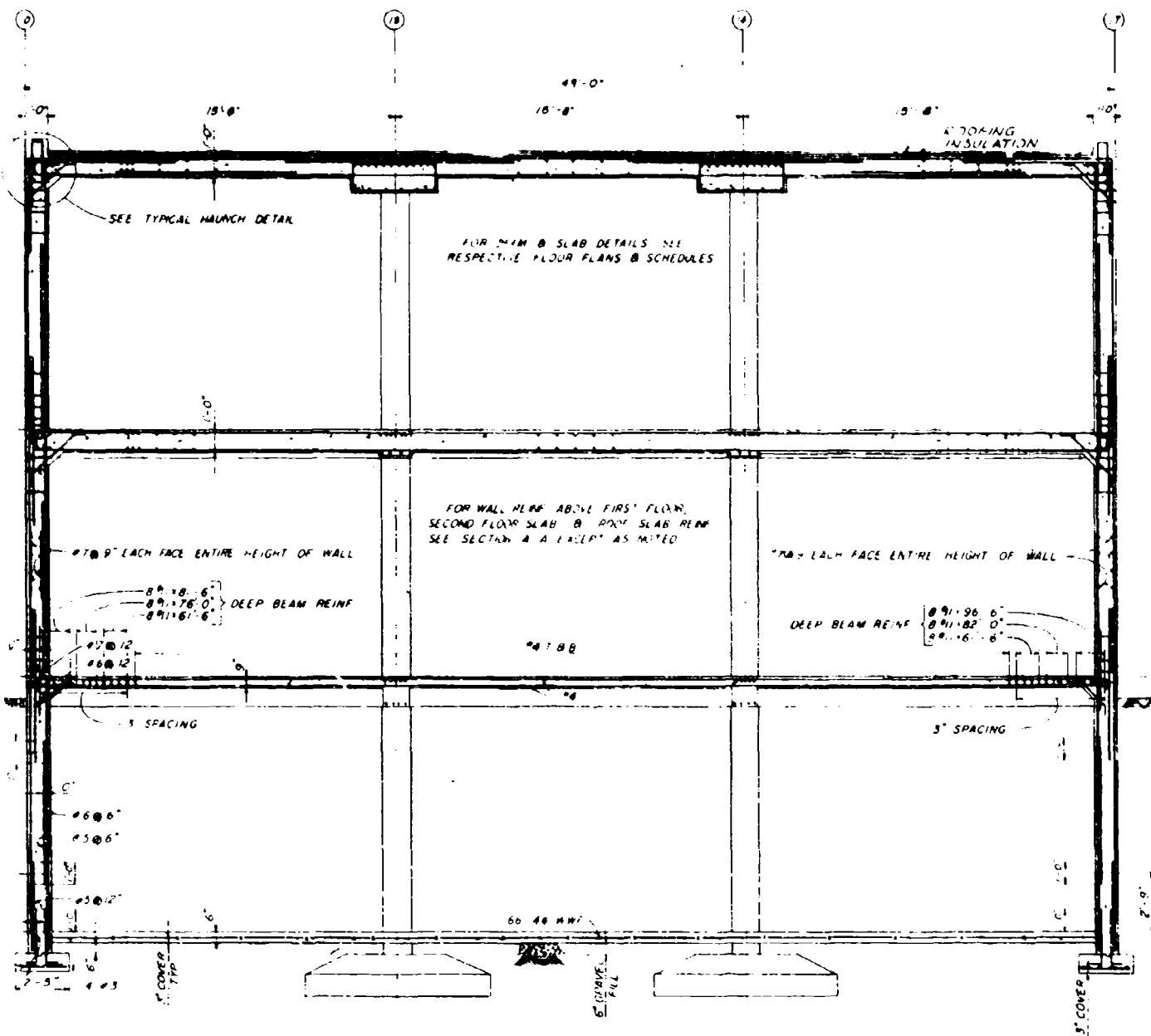


ROOF FRAMING PLAN







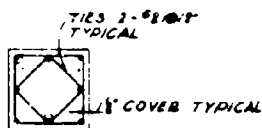


SECTION B-B  
SCALE: 1/4" = 1'-0"

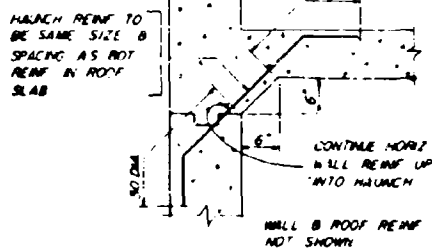
NOTE

CONCRETE COVER TO REINFORCING BARS IS AS FOLLOWS EXCEPT AS NOTED:

FLOOR SLABS	2" OVER 1000
EXTERNAL WALLS	2" OVER 1000
INTERNAL WALLS	2" OVER 1000



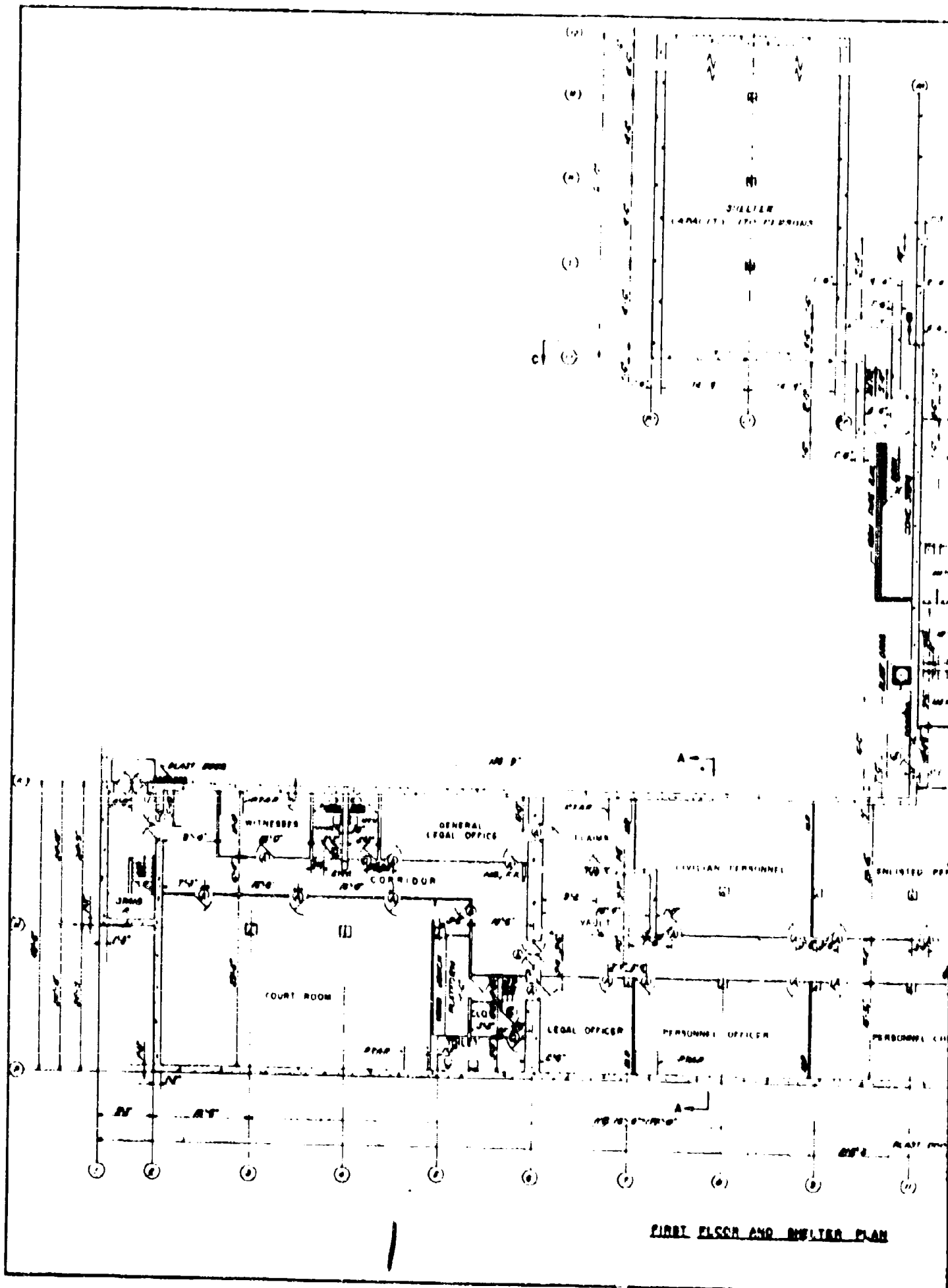
SECTION B-B



TYPICAL HAUNCH DETAIL  
SCALE: 1/4" = 1'-0"

REVISION	DATE	DESCRIPTION	BY	APPROVED
AMMANN & WHITNEY		DEPARTMENT OF THE ARMY		
CONSULTING ENGINEERS		OFFICE OF THE CHIEF OF ENGINEERS		
111 8TH AVENUE, NEW YORK, N. Y.		MILITARY CONSTRUCTION ENGINEERING DIVISION		
DESIGNED BY D. H. J. S.		PROJECT NO. 60-16-01		
CHECKED BY G. P.		DATE 6-4-58		
DRAWN BY		SCALE AS NOTED		
TITLE		SHEET 2 OF 2		

**PROTECTIVE CONSTRUCTION  
ADMINISTRATION BUILDING  
20 PSI BLAST RESISTANT**



# DESIGN CONDITIONS

## Design Procedure

As accordance with UCE manual, "Design of Structures for Protection from the Effects of Atomic Weapons"

## Design Blast Wave

Peak instant pressure = 30psi Duration = 1.05 sec

## Blast Loading on Roof

Peak pressure = 30psi Duration = 1.05 sec

## Blast Loading on Walls

Peak pressure = 100psi Duration = 1.05 sec

## Minimum Radiation Protection for Shelter Area

Total gamma and neutron attenuation to 5% for a 2047 weapon at any position which will produce a peak blast pressure equal to 30psi

## Strength of Materials

	Steel	Steel Design
Soil bearing capacity	8,000psi	15,000psi
Concrete, f <sub>c</sub>	4,000psi	5,000psi
Rein. steel, lower yield	47,000psi	52,000psi
Hot Grade, ASTM A36 S37		
Structural steel, lower yield	38,000psi	41,600psi
(ASTM A7 S37)		
*rated capacity of soil		

## Allowable Stresses and Deflections

Rein. walls, columns and footings designed for plastic deformation under design blast load. Blast doors designed for maximum elastic deformation under design blast load.

## General Notes

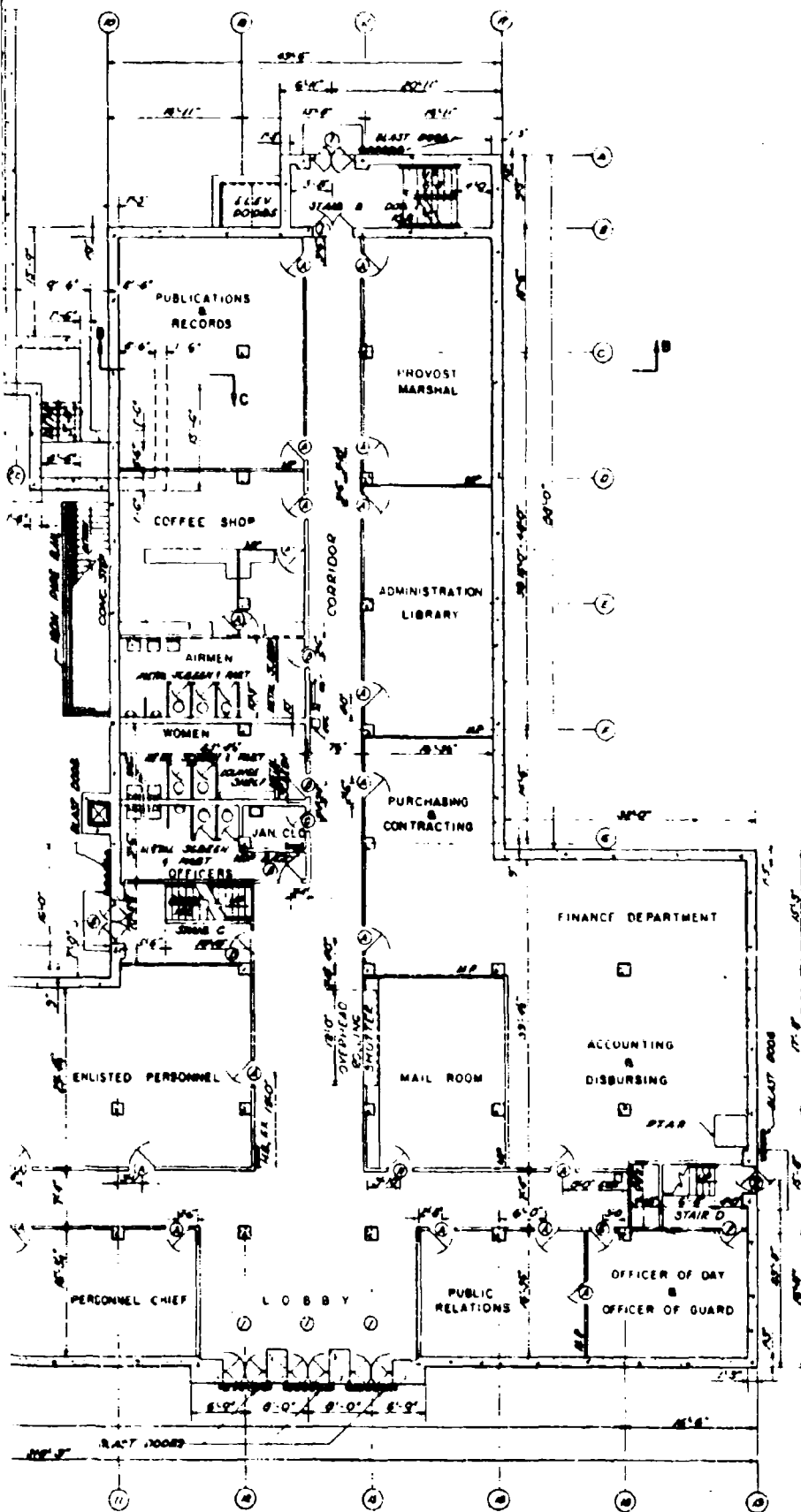
- The following features are not shown and shall be determined by user requirements:  
Mechanical and electrical equipment  
Air ACES and decontamination facilities
- This design study is based upon Dept. of the Air Force definitive Drawing No. 30 DE DB, Westover AFB Drawing No. 30-12 DE

## ABBREVIATIONS

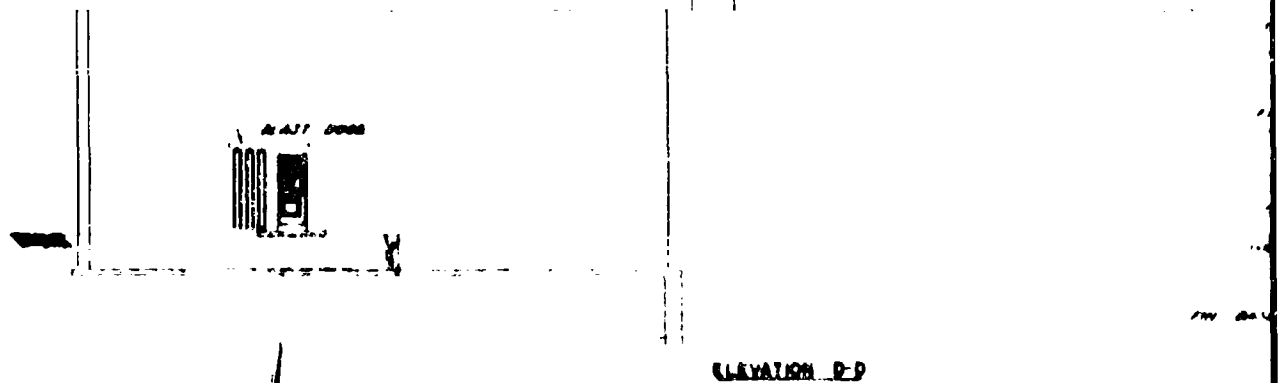
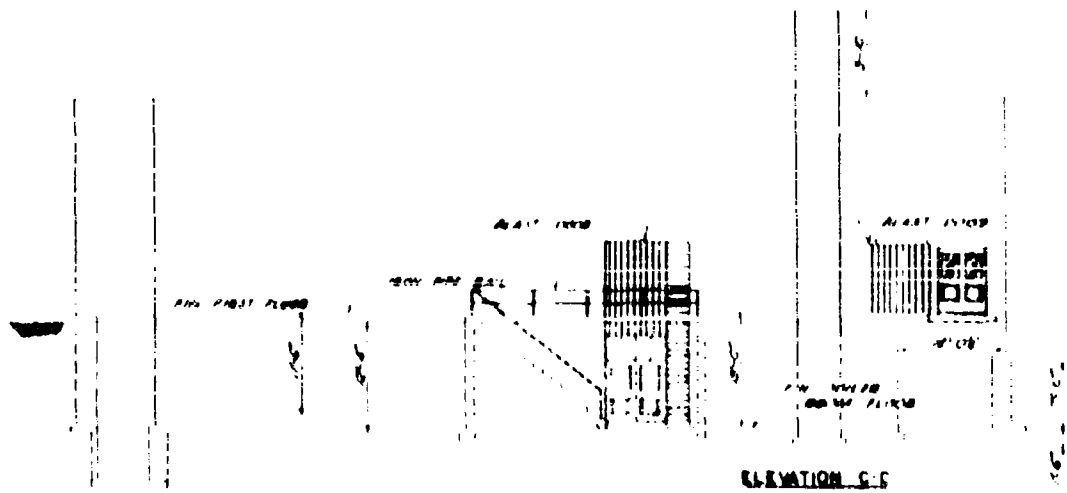
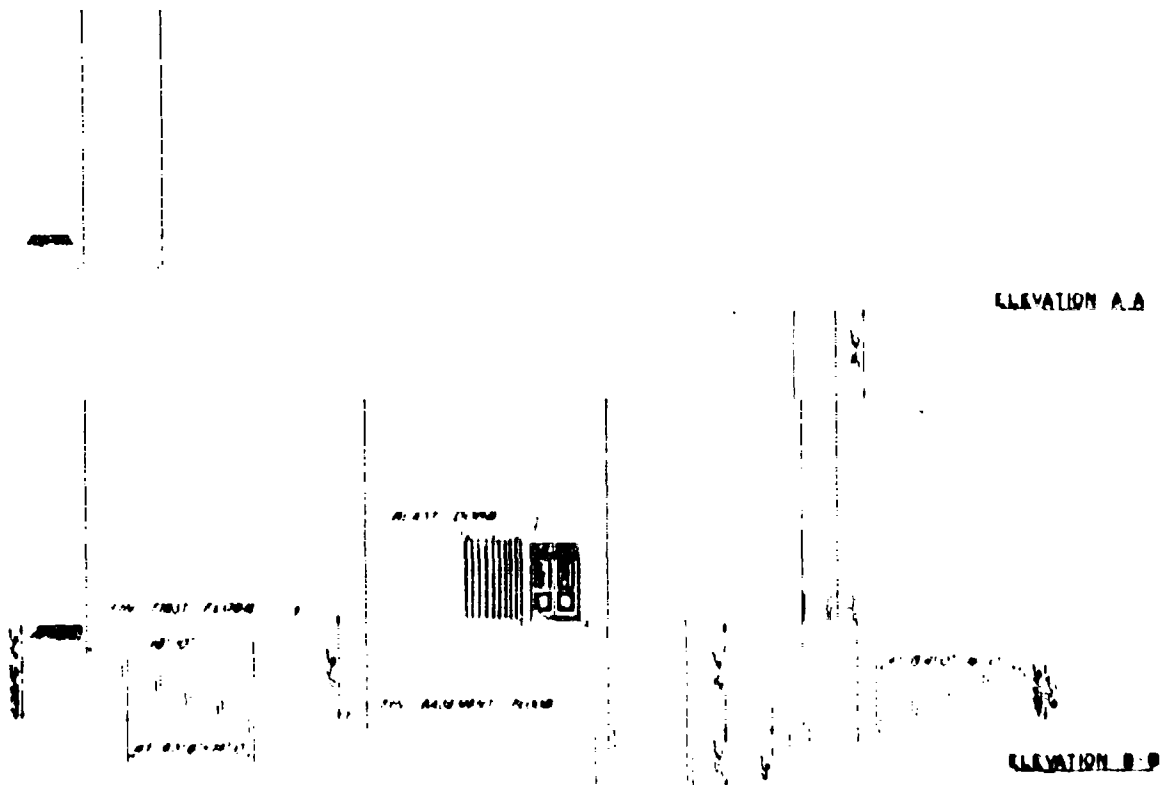
CLO	CLOSET
CONC	CONCRETE
ELEV	ELEVATOR
EWCO	ELECTRIC WATER COOLER
FIN	FINISHED
FE	FIRE EXTINGUISHER
HQ	40% RATE
MP	MOVABLE PARTITION
MBT	PARTITION
PTAP	PIPE TRENCH ACCESS PANEL
R	RISERS

## MATERIAL LEGEND

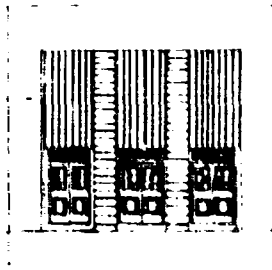
CONC	CONCRETE
WOOD	WOOD STUD PARTITION
MOV	MOVABLE PARTITION



<b>ARMSTRONG &amp; WHITNEY</b> 111-2TH AVENUE, NEW YORK, N. Y.		<b>DEPARTMENT OF THE ARMY</b> OFFICE OF THE CHIEF OF ENGINEERS HEADQUARTERS, WASHINGTON, D. C.	
<b>PROTECTIVE CONSTRUCTION</b> <b>ADMINISTRATION BUILDING</b> <b>30 PSI BLAST RESISTANT</b>			
DRAWN BY CHECKED BY DESIGNED BY APPROVED BY	DATE SCALE SHEET NO.	PROJECT NO. DRAWING NO.	60-16-01 SHEET 1 OF 3



SECTION A-A



TOP OF ROOF

FIN SECOND FLOOR

FIN FIRST FLOOR

GROUND LINE

SECTION A-A

TOP OF ROOF

FIN SECOND FLOOR

FIN FIRST FLOOR

GROUND LINE

SECTION B-B

TOP OF ROOF

FIN SECOND FLOOR

FIN FIRST FLOOR

GROUND LINE

SECTION B-B

TOP OF ROOF

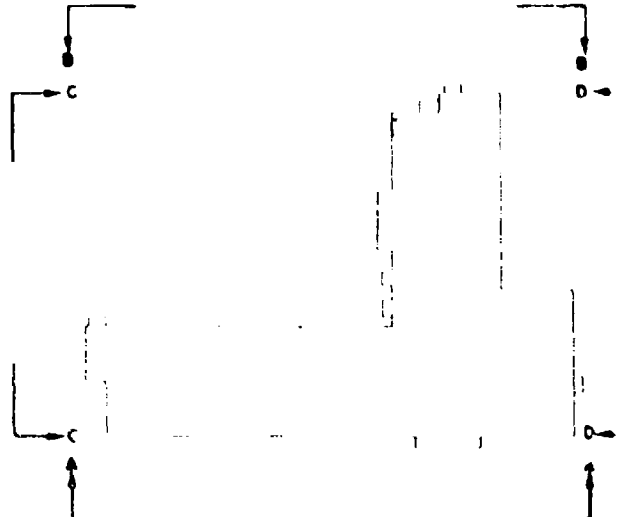
FIN SECOND FLOOR

FIN FIRST FLOOR

GROUND LINE

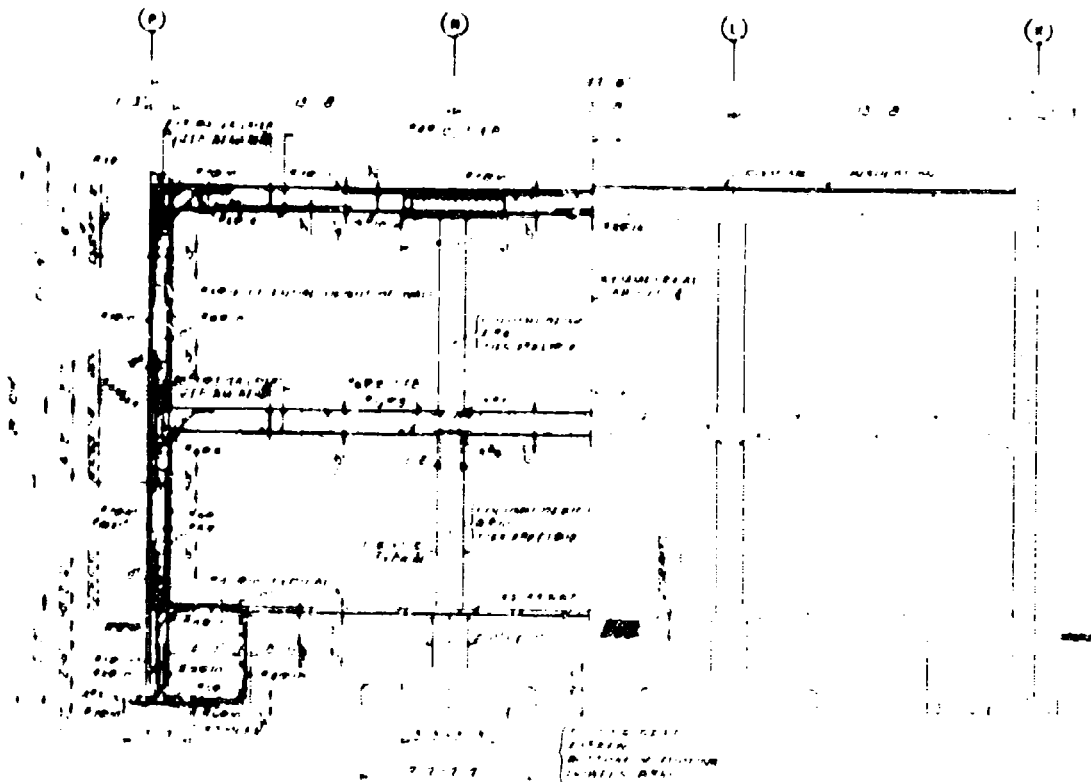
FIN BASEMENT FLOOR

SECTION C-C



<b>AMMANN &amp; WHITNEY</b> 111 5th AVENUE, NEW YORK, N. Y.		<b>DEPARTMENT OF THE ARMY</b> HEADQUARTERS, WASHINGTON, D. C.	
<b>PROTECTIVE CONSTRUCTION</b> <b>ADMINISTRATION BUILDING</b> <b>50 PSI BLAST RESISTANT</b>		<b>80-16-01</b>	
DATE: 8-16-61		SHEET 2 OF 3	

2



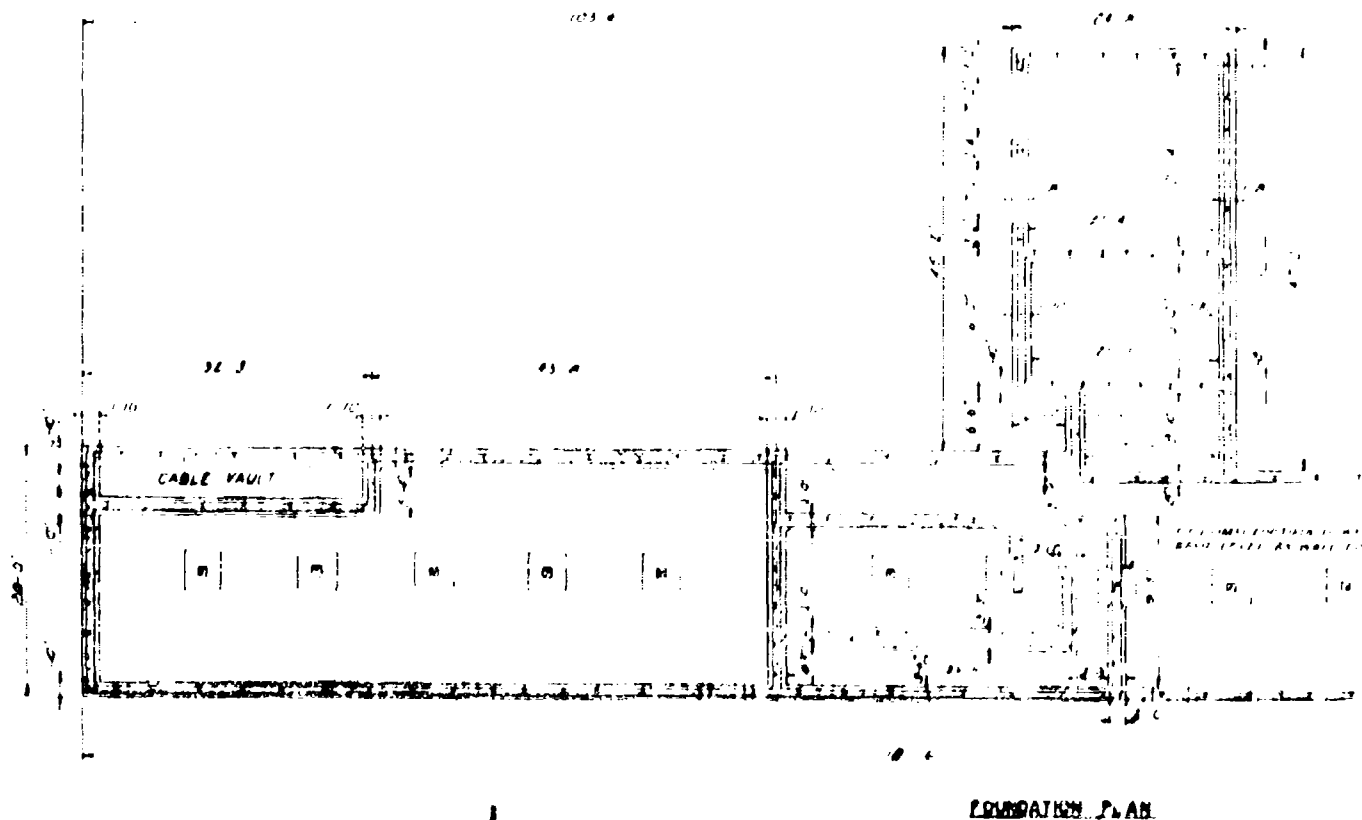
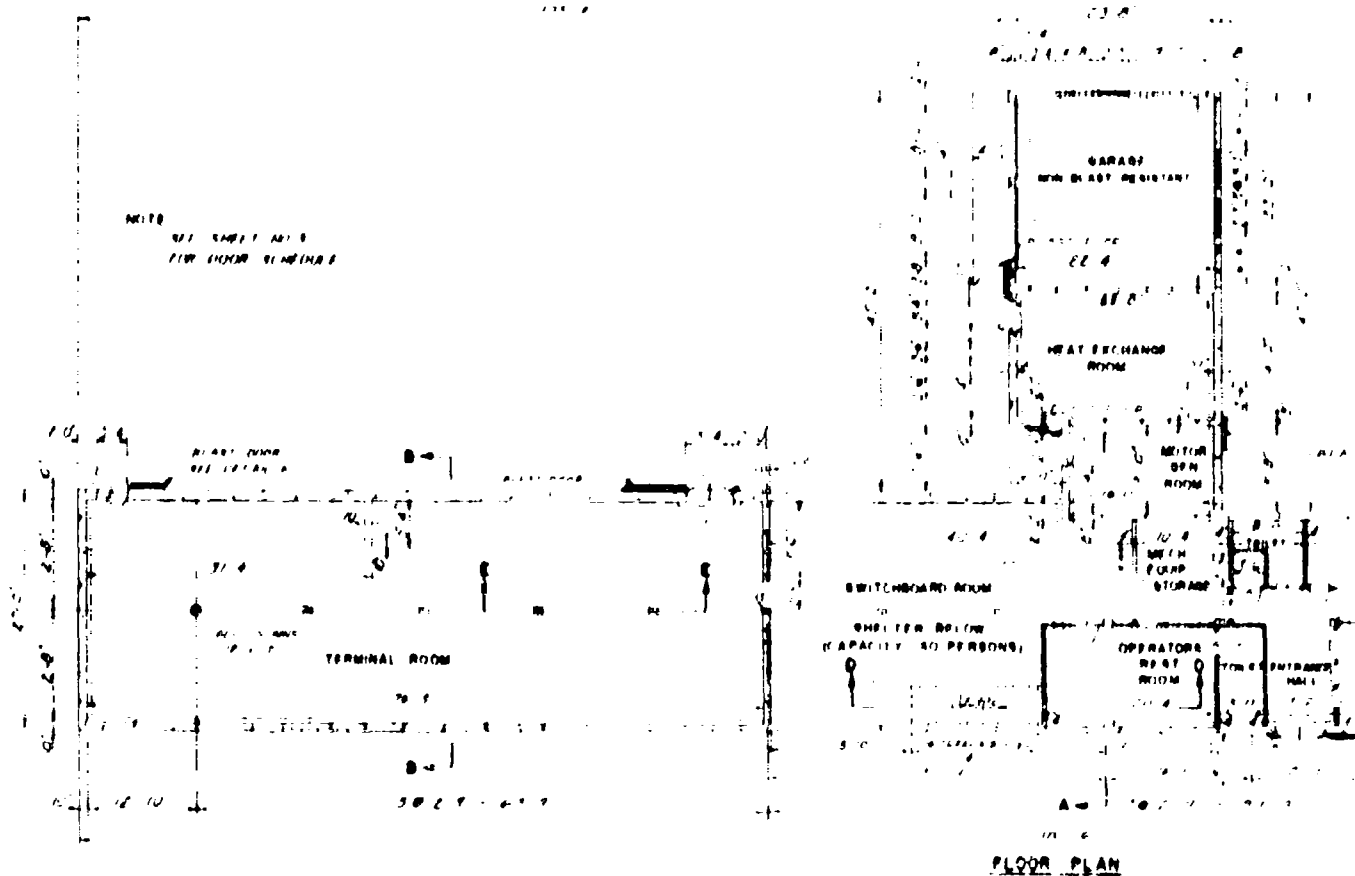
SECTION A-A



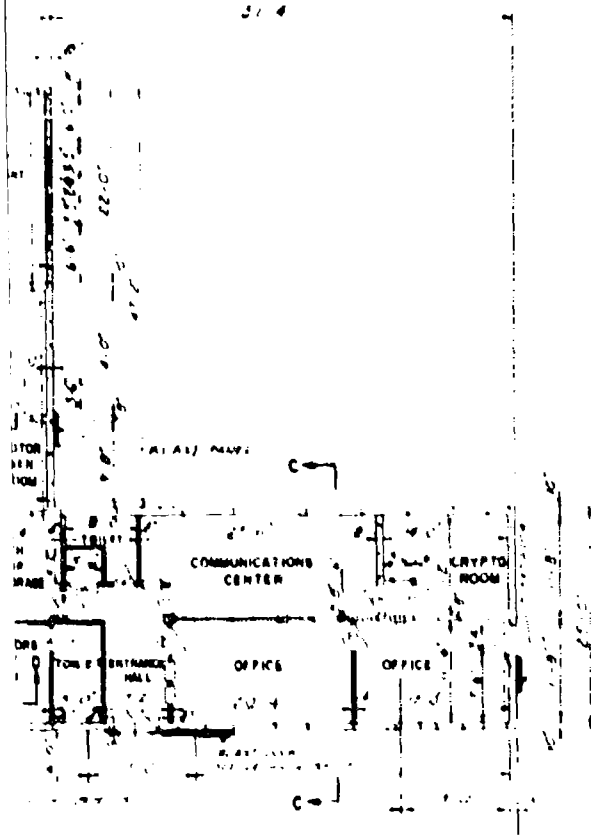
SECTION C-C







314



### DESIGN CONDITIONS

#### Design Pressure

As determined by the design of the structure in accordance with the provisions of the design code.

#### Design Blast Wave

As determined by the design of the structure in accordance with the provisions of the design code.

#### Blast Loading on Roof

As determined by the design of the structure in accordance with the provisions of the design code.

#### Blast Loading on Walls

As determined by the design of the structure in accordance with the provisions of the design code.

#### Nuclear Radiation Protection for Shelter Area

As determined by the design of the structure in accordance with the provisions of the design code.

#### Strength of Materials

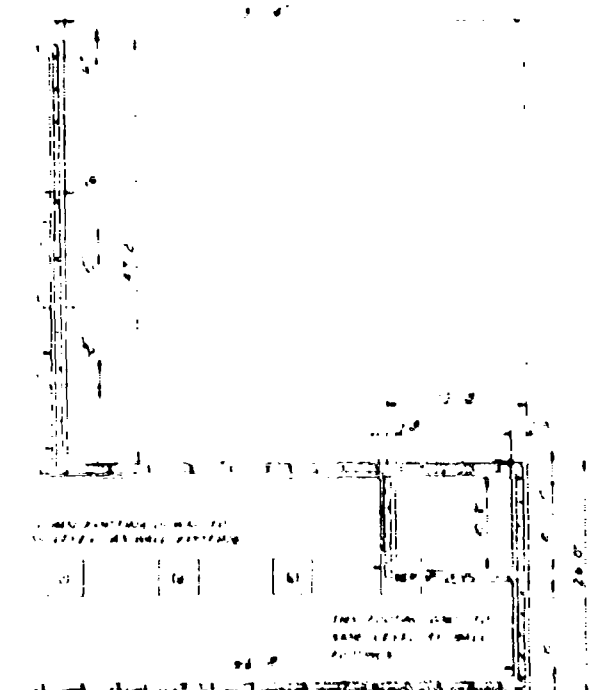
	Static	Blast Design
Concrete	4000 psi	4000 psi
Steel	36,000 psi	36,000 psi
Reinforcing Steel	40,000 psi	40,000 psi
Aluminum	15,000 psi	15,000 psi
Brass	15,000 psi	15,000 psi
Lead	15,000 psi	15,000 psi
Other	As specified	As specified

#### Allowable Stresses and Deflections

As determined by the design of the structure in accordance with the provisions of the design code.

#### General Notes

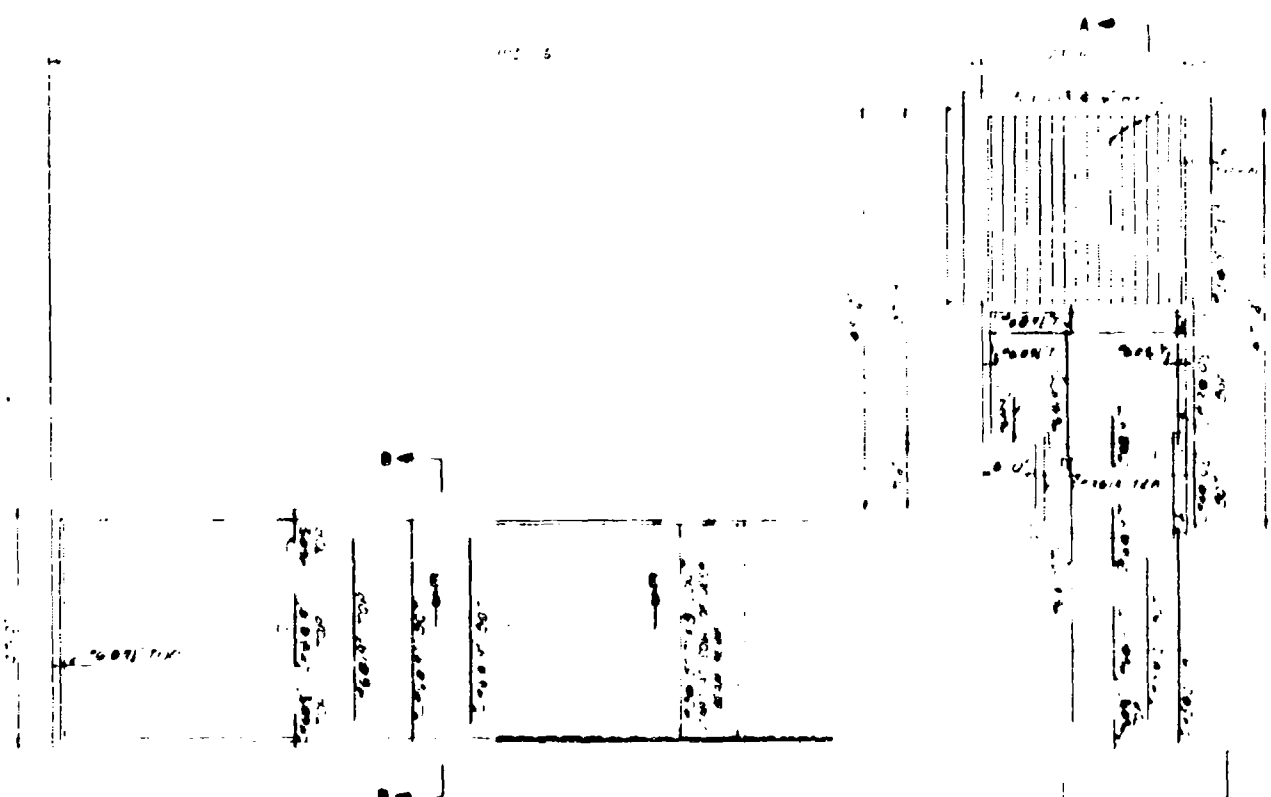
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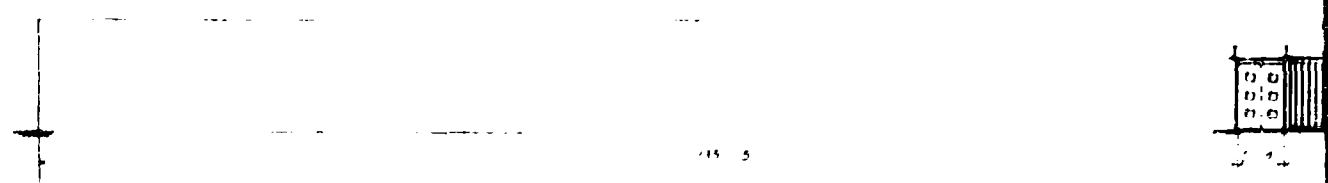
DESIGNED BY: [Signature]  
CHECKED BY: [Signature]

<b>AMMANN &amp; WHITNEY</b> 111 5th Avenue, New York, N.Y.		<b>DEPARTMENT OF THE ARMY</b> 111 5th Avenue, New York, N.Y.	
<b>PROTECTIVE CONSTRUCTION COMMUNICATIONS BUILDING 10 PSI BLAST RESISTANT</b>			
DRAWN BY: [Signature] CHECKED BY: [Signature]		DATE: 10-28-66	

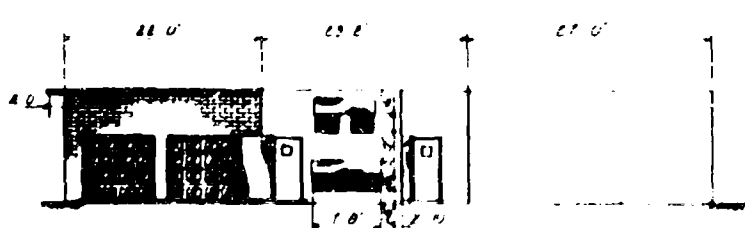
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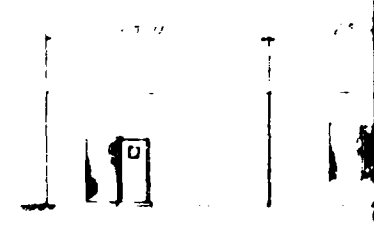
ROOF PLAN  
SCALE 1/4" = 1'-0"



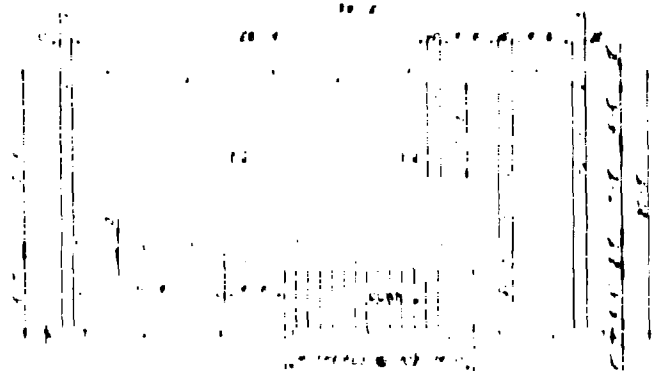
ELEVATION A  
SCALE 1/4" = 1'-0"



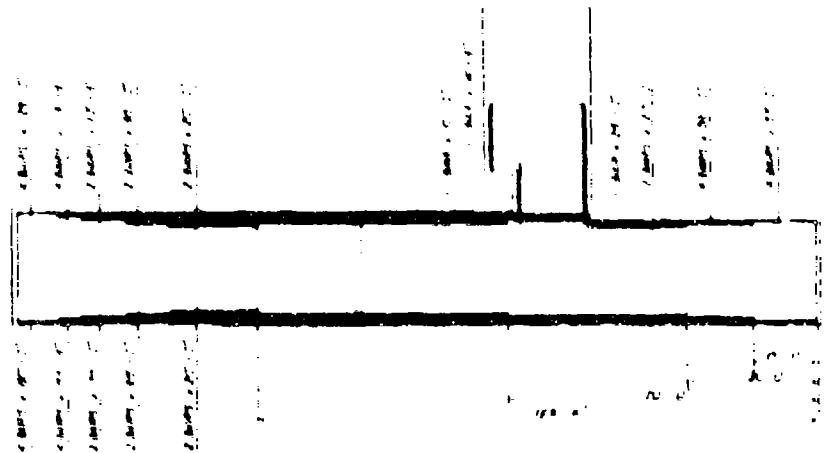
ELEVATION B  
SCALE 1/4" = 1'-0"



ELEVATION C  
SCALE 1/4" = 1'-0"

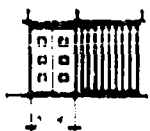


PLAN OF SHELTER  
SCALE: 1" = 10'



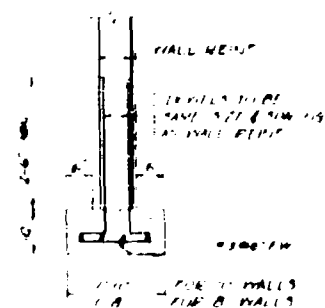
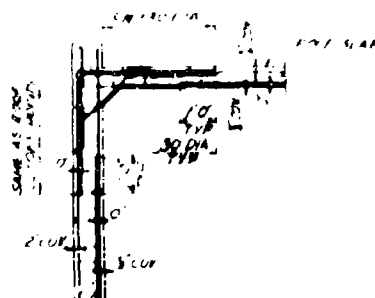
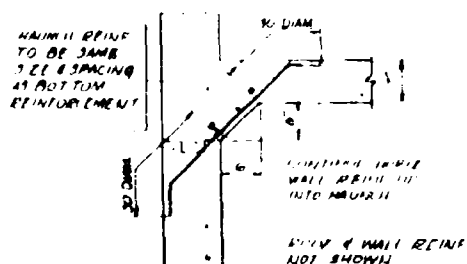
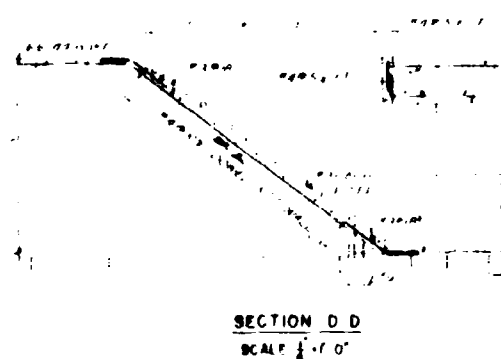
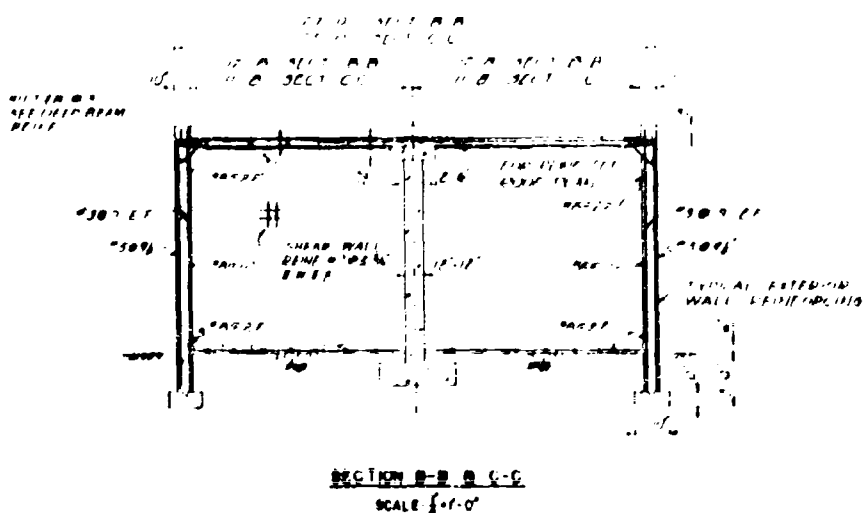
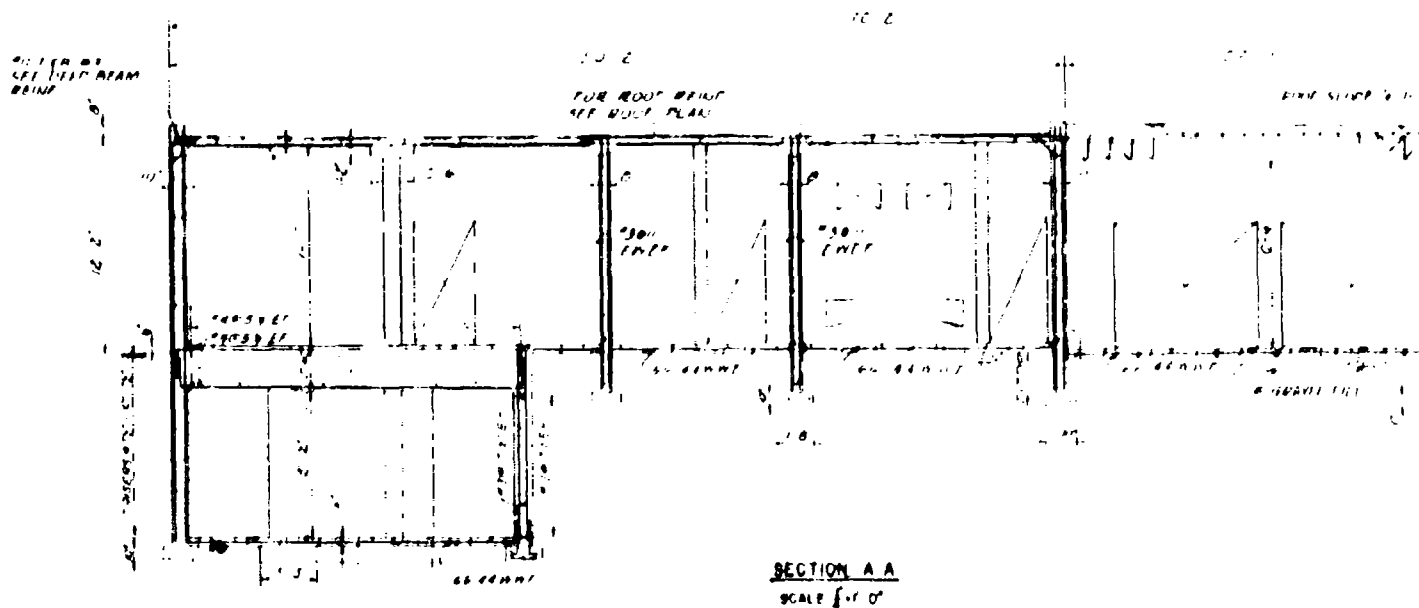
ROOF SLAB  
DECK BEAM REINFORCEMENT

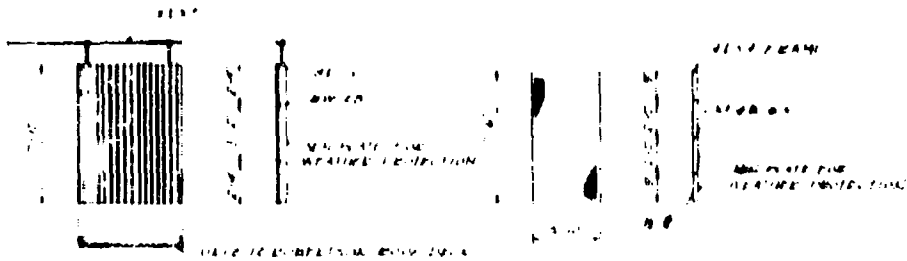
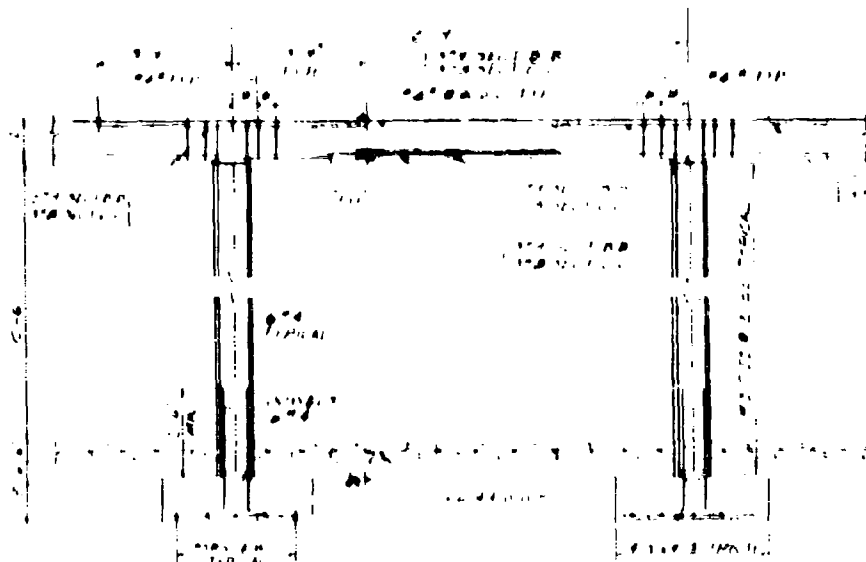
<b>AMMANN &amp; WHITNEY</b> 111 BAY AVENUE NEW YORK 11		<b>DEPARTMENT OF THE ARMY</b> 111 BAY AVENUE NEW YORK 11	
DRAWN BY CHECKED BY DESIGNED BY APPROVED BY DATE OF THIS D. 6-6-63		<b>PROTECTIVE CONSTRUCTION</b> <b>COMMUNICATIONS BUILDING</b> <b>10 PS: BLAST RESISTANT</b> SEE DRAWING FOR MORE DETAILS OF AS NOTED 66-68-83 6-6-63	



ELEVATION S.  
SCALE: 1" = 10'

2

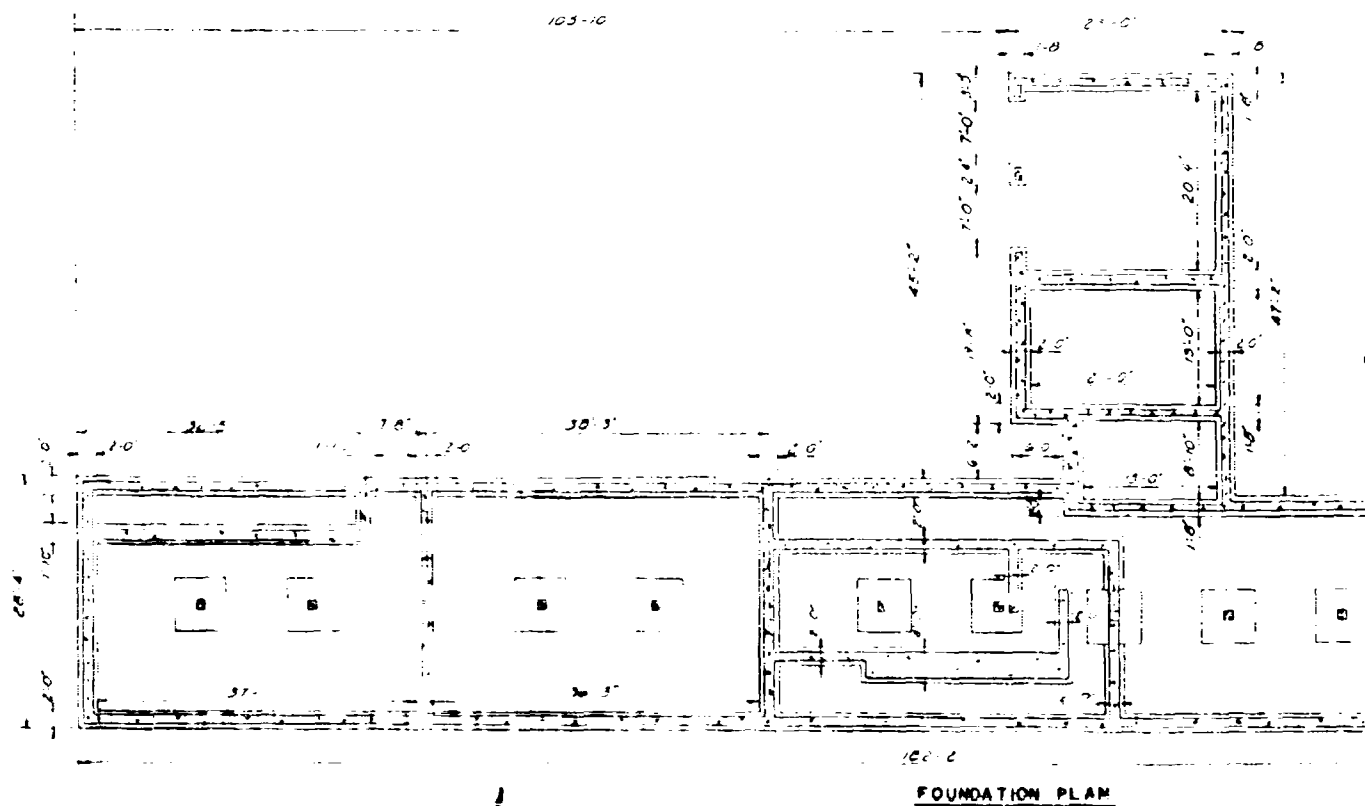
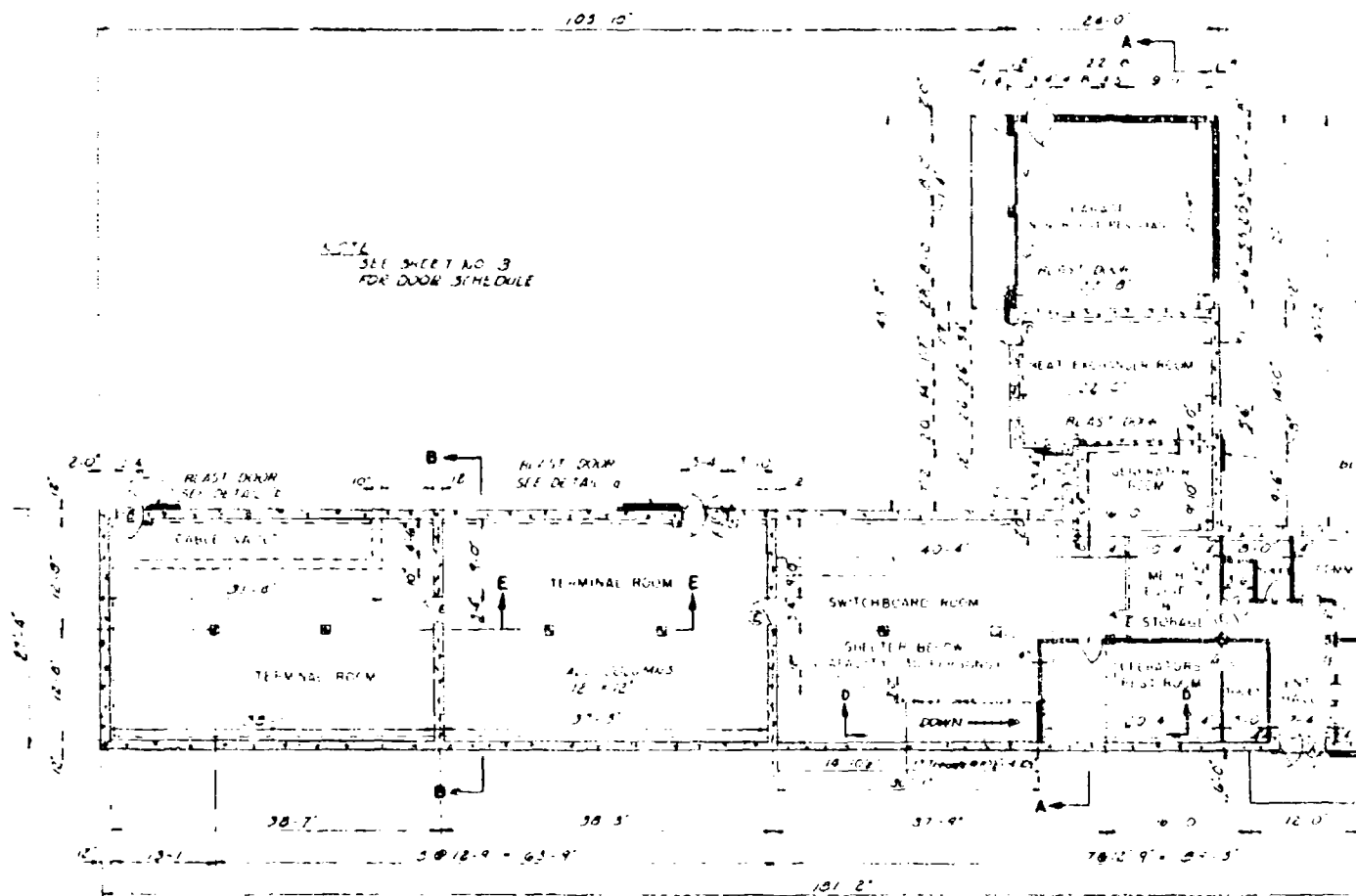


[illegible]

**ARMANN & WHITNEY**

**DEPARTMENT OF THE ARMY**

**PROTECTIVE CONSTRUCTION COMMUNICATIONS BUILDING NO FBI BLAST RESISTANT**



High Forest

1. The first group of people who are interested in the study of the history of the United States are the people who are interested in the history of the United States.

Time .. 01:41 Wave

Plot 1 - very poor soil

### Steel Lining on Walls

### Nuclear Radiation Protection for Shelter Area

### Strength of Materials

Figure 1

Dist. 1000

### Airways disease and emphysema

### General Notes

1000

1. *Chlorophyll a* and *Chlorophyll b* contents were determined by spectrophotometry using the following equations:

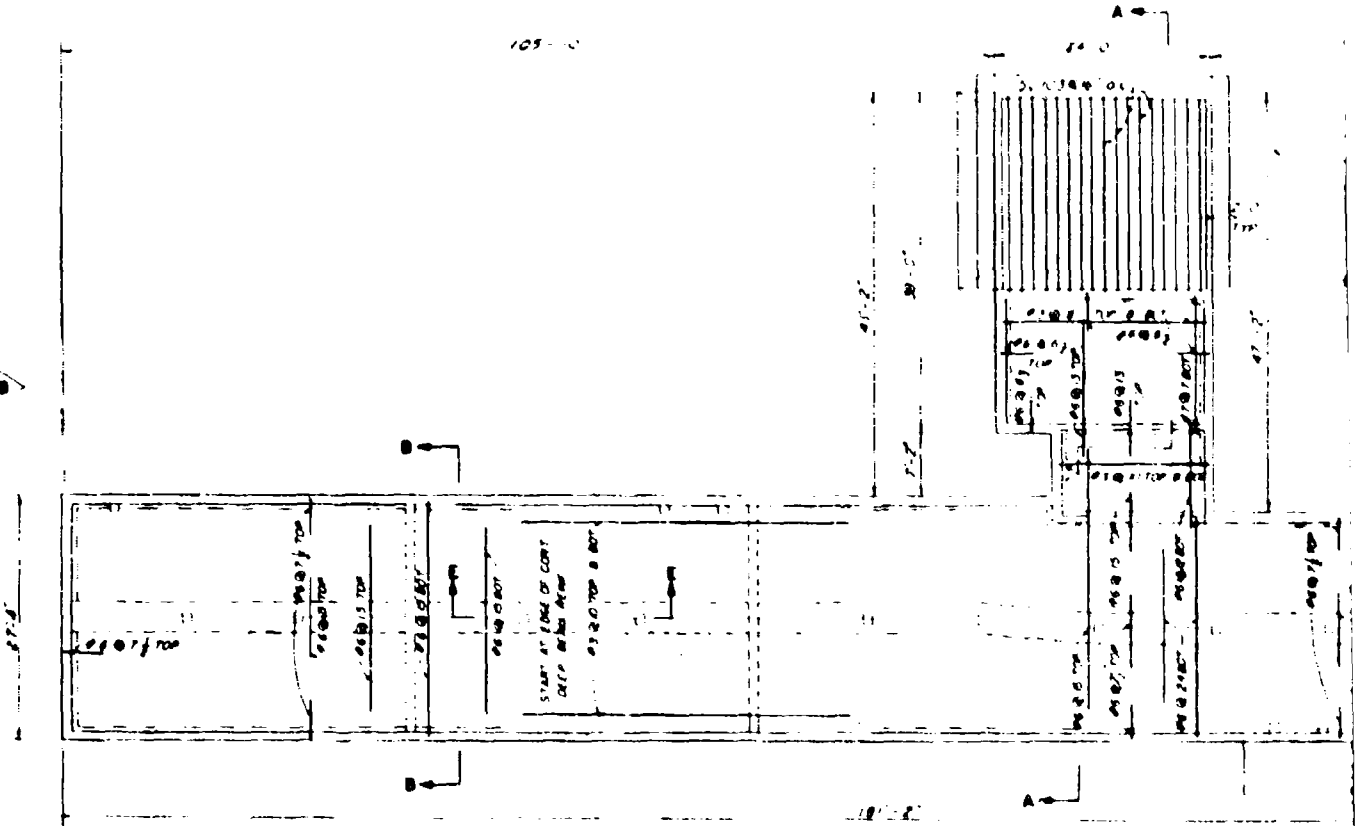
附註：本報為便利讀者起見，特將本報地址及電話號碼刊後，以便讀者隨時向本報索取資料。

**THE**

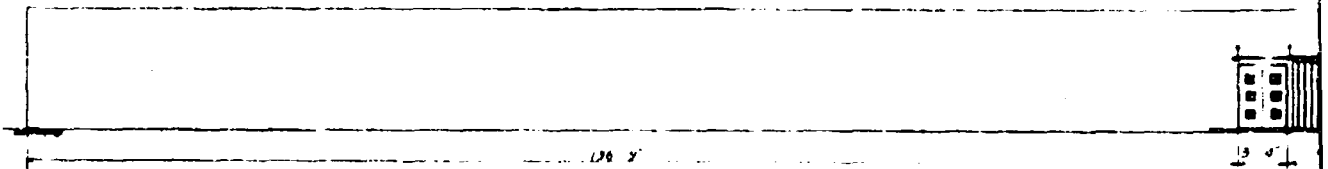
$$i = 1, \dots, n, \quad A = 0.$$

**ARMANN & WHITNEY**  
PROTECTIVE CONSTRUCTION  
COMMUNICATIONS BUILDING  
23 FBI BLAST RESISTANT

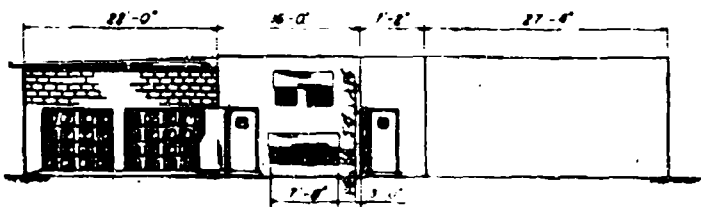




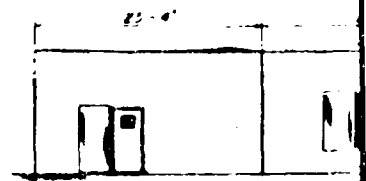
ROOF PLAN



ELEVATION A



ELEVATION B



ELEVATION C

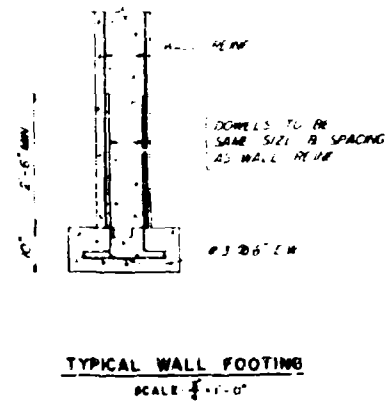
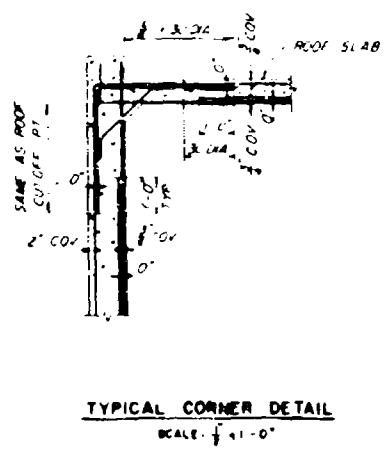
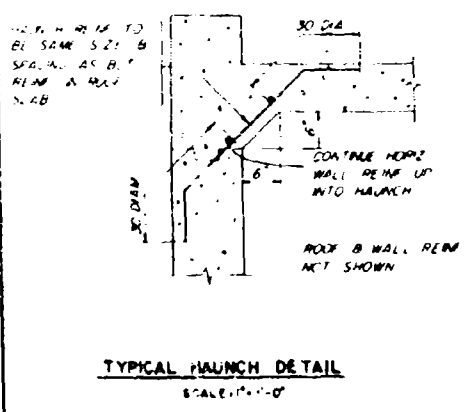
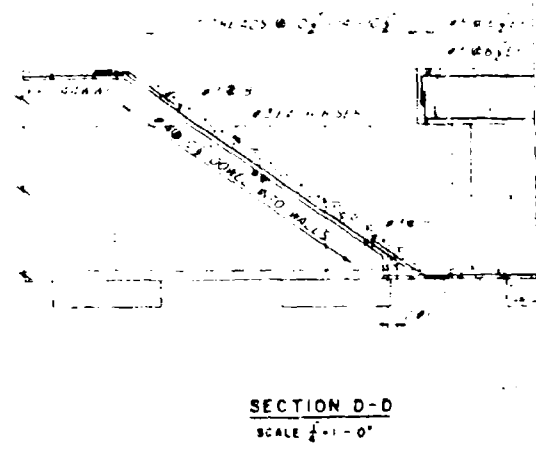
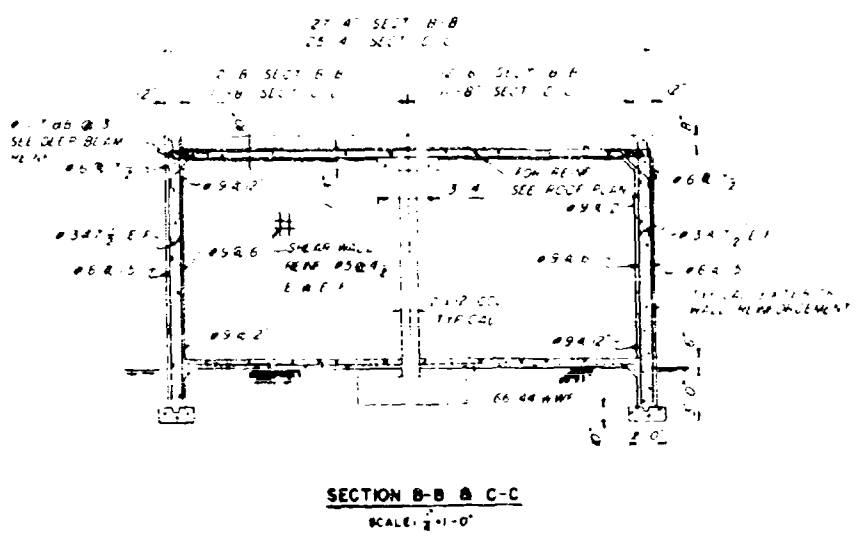
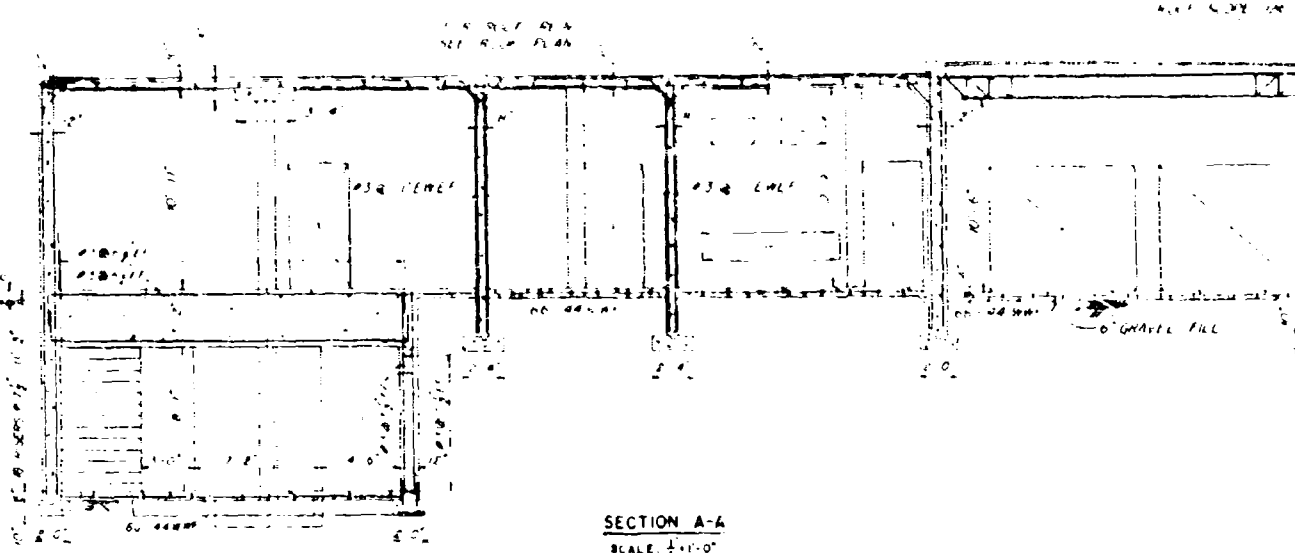
PLAN OF SHELTER  
SCALE 1/4" = 1'-0"

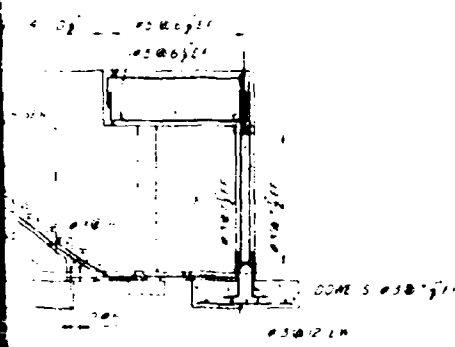
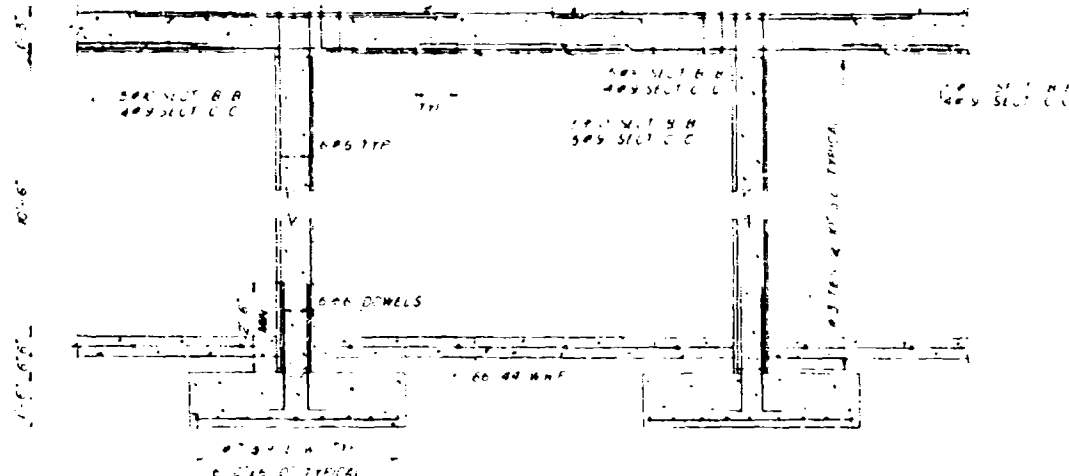
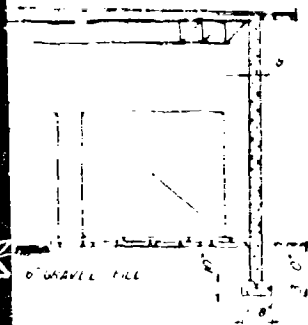
DEEP BEAM REINFORCEMENT

ELEVATION D

DESIGNED BY ARMSTRONG & WHITNEY	CHECKED BY [Signature]
DRAWN BY [Signature]	DATE [Date]
<p>PROTECTIVE CONSTRUCTION COMMUNICATIONS BUILDING 80 PSI BLAST RESISTANT</p>	
<p>NOTED BY [Signature]</p>	

2

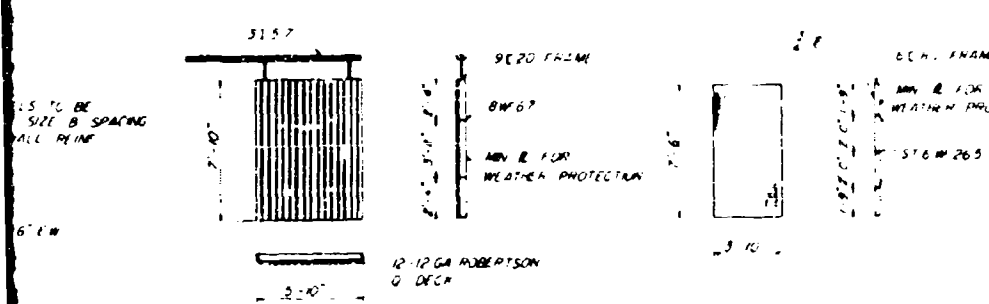




DOOR SCHEDULE		
PLAN SYMBOL	SIZE	MATERIAL
A	2'-0" x 6'-0"	WP SOLID CORE
B	3'-0" x 7'-0"	DO
C	3'-0" x 7'-0"	DO
D	3'-0" x 7'-0"	DO
E	3'-0" x 6'-0"	ARCH MULLION CORE
F	2'-0" x 6'-0"	DO
G	2'-0" x 6'-0"	DO
H	3'-0" x 6'-0"	WELDED METAL
I	3'-0" x 6'-0"	WELDED METAL
J	3'-0" x 6'-0"	WELDED METAL
K	3'-0" x 6'-0"	DO

#### NOTES

1. FOR HEAVY FRAME BEAMS ALL REINFORCING STEEL TO BE A MIN OF 3 #4 AT 14" P.C. OF SPAN.
2. FOR BEAMS MAX ALLOWABLE STIRRUPS TO BE #15 PER IN.

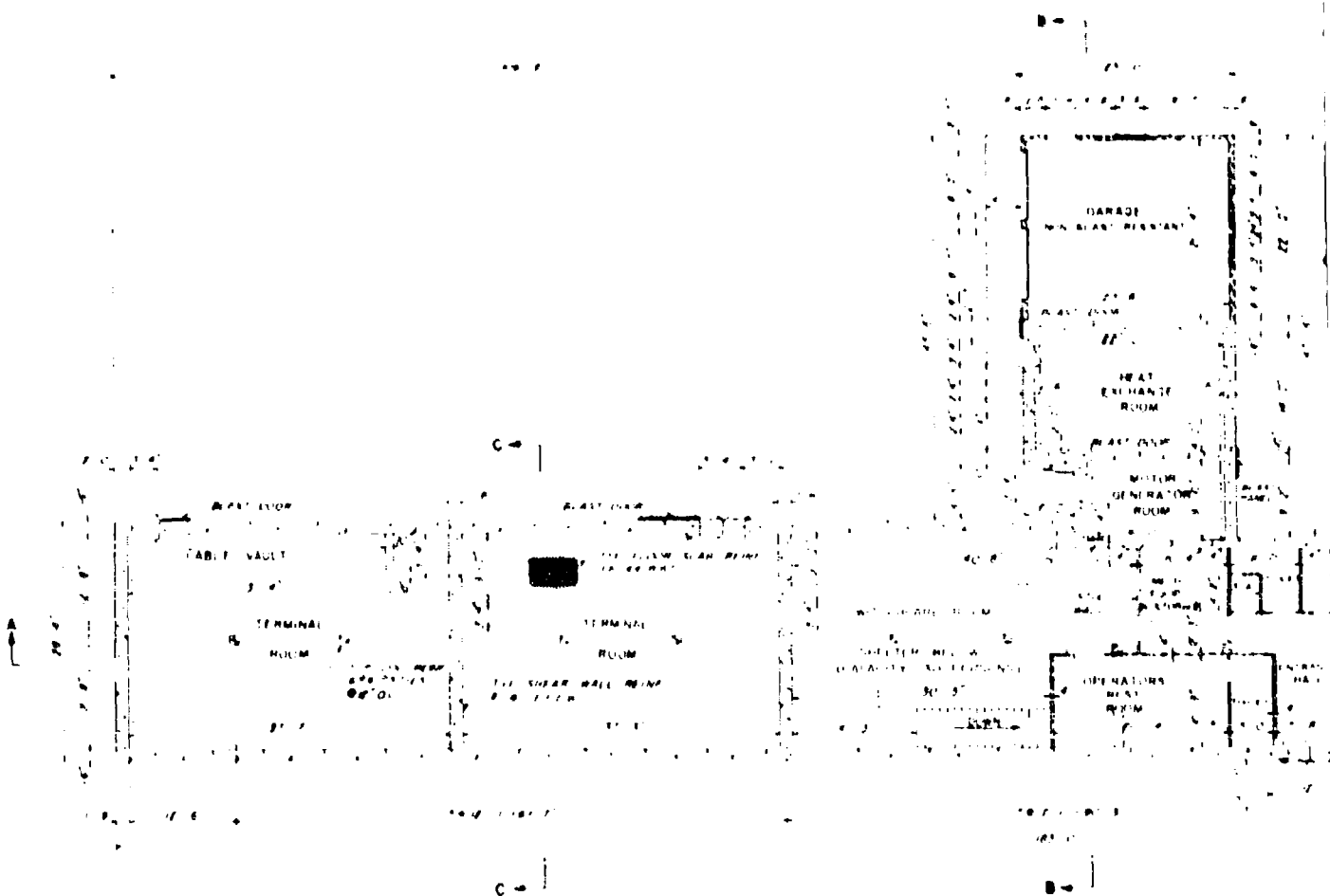


NOTING

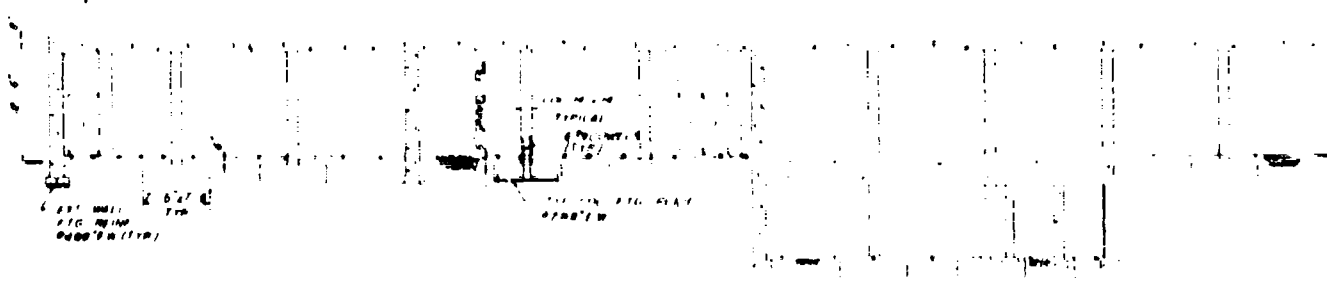
DETAIL D  
TYPICAL  
SCALE 1/2" = 1'-0"

DETAIL E  
TYPICAL  
SCALE 1/2" = 1'-0"

DESIGNED BY DATE CHECKED BY DATE APPROVED BY DATE		DESCRIPTION PROJECT DRAWING NO.	
AMMANN & WHITNEY CONSULTING ENGINEERS 111 8TH AVENUE, NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.	
<b>PROTECTIVE CONSTRUCTION COMMUNICATIONS BUILDING 20 PSI BLAST RESISTANT</b>			
DRAWN BY DATE CHECKED BY DATE APPROVED BY DATE		SCALE AS NOTED SHEET NO. 60-02-55 SHEET 3 OF 3	



FLOOR PLAN



SECTION A-A



SECTION B-B

**Design Pressures**

Design Pressures are based on the following assumptions:

**Design Blast Wave**

Design Blast Wave is based on the following assumptions:

**Blast Loading on Roof**

Blast Loading on Roof is based on the following assumptions:

**Blast Loading on Walls**

Blast Loading on Walls is based on the following assumptions:

**Nuclear Radiation Protection for Shelter Area**

Nuclear Radiation Protection for Shelter Area is based on the following assumptions:

**Strength of Materials**

Strength of Materials	Static	Blast Design
Steel Reinforcing Bars	40,000 psi	40,000 psi
Concrete	4,000 psi	4,000 psi
Aluminum	15,000 psi	15,000 psi
Structural Steel	36,000 psi	36,000 psi
Structural Steel	36,000 psi	36,000 psi
Structural Steel	36,000 psi	36,000 psi

**Allowable Stresses and Deflections**

Allowable Stresses and Deflections are based on the following assumptions:

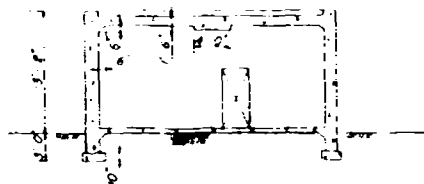
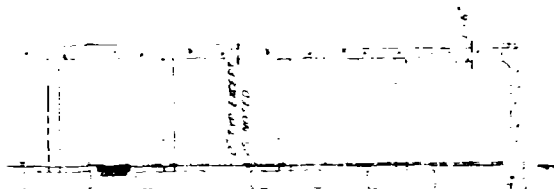
**General Notes**

1. This drawing is for the design of the Protective Construction Communications Building, 30 PSI Blast Resistant.

2. The building is to be constructed of concrete and steel.

3. The building is to be constructed of concrete and steel.

4. The building is to be constructed of concrete and steel.

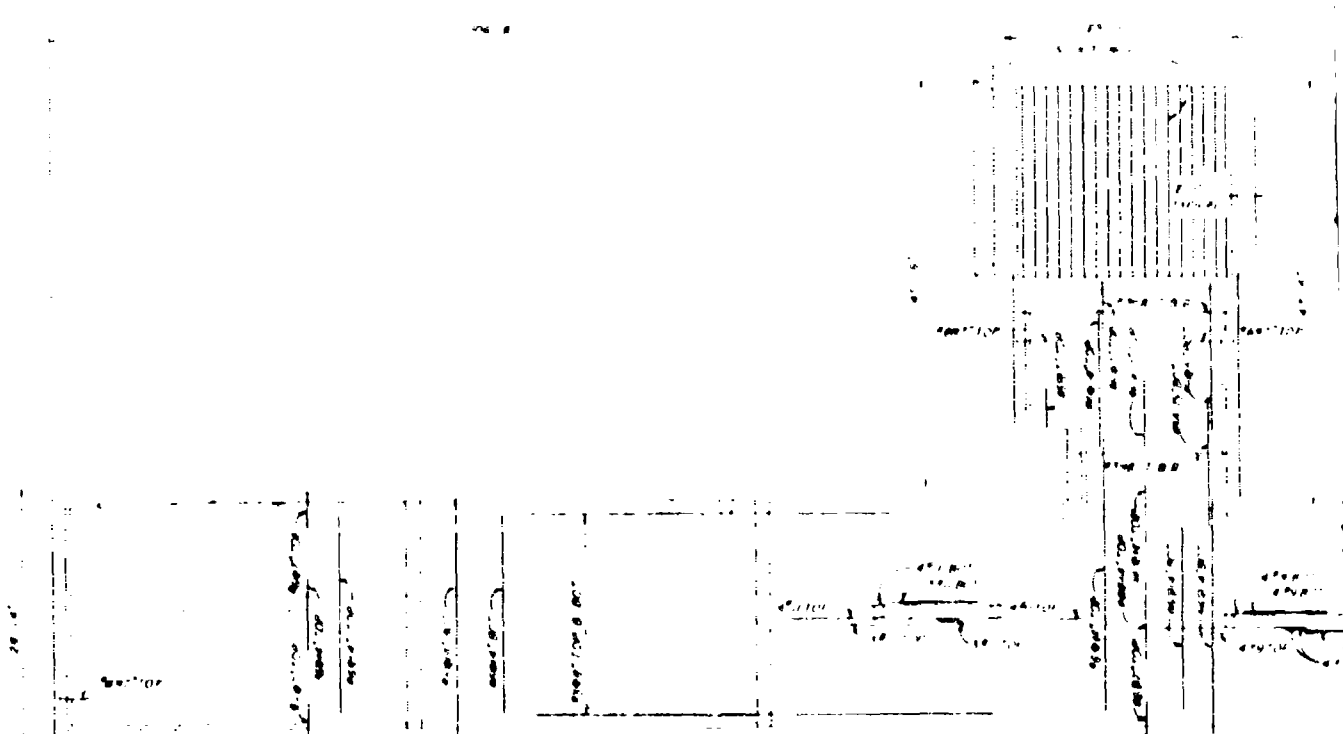


SECTION C-C

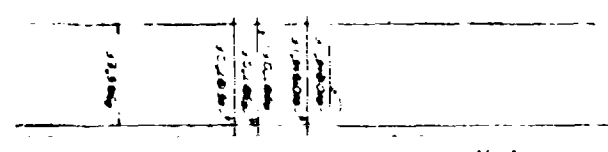
2

1. CONCRETE	2. STEEL	3. GLASS
4. ALUMINUM	5. BRICK	6. EARTH
7. CONCRETE BLOCK	8. GLASS	

AMMANN & WHITNEY 111 5TH AVENUE, NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.	
DESIGNED BY J. S.		CHECKED BY J. S.	
DRAWN BY J. S.		APPROVED BY J. S.	
DATE JAN 1956		SCALE 1/8" = 1'-0"	
PROJECT PROTECTIVE CONSTRUCTION COMMUNICATIONS BUILDING 30 PSI BLAST RESISTANT		DRAWING NUMBER 60-02-56	
SHEET 1 OF 2		SHEET NO. 1 OF 2	

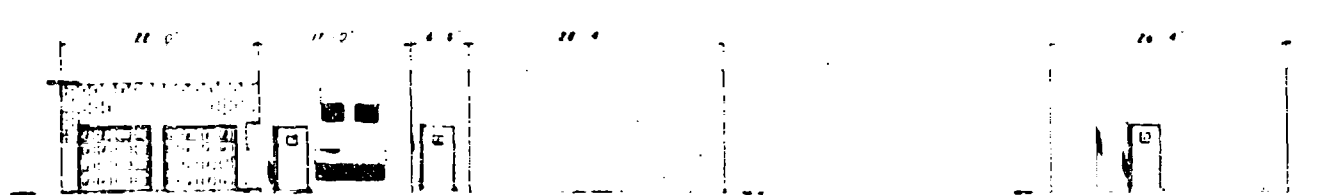


ROOF PLAN  
SCALE 1/4" = 1'-0"



NOTE: WALL BEING BUILT  
TYPICAL FOR ALL EXTERIOR WALLS

ELEVATION A  
SCALE 1/4" = 1'-0"

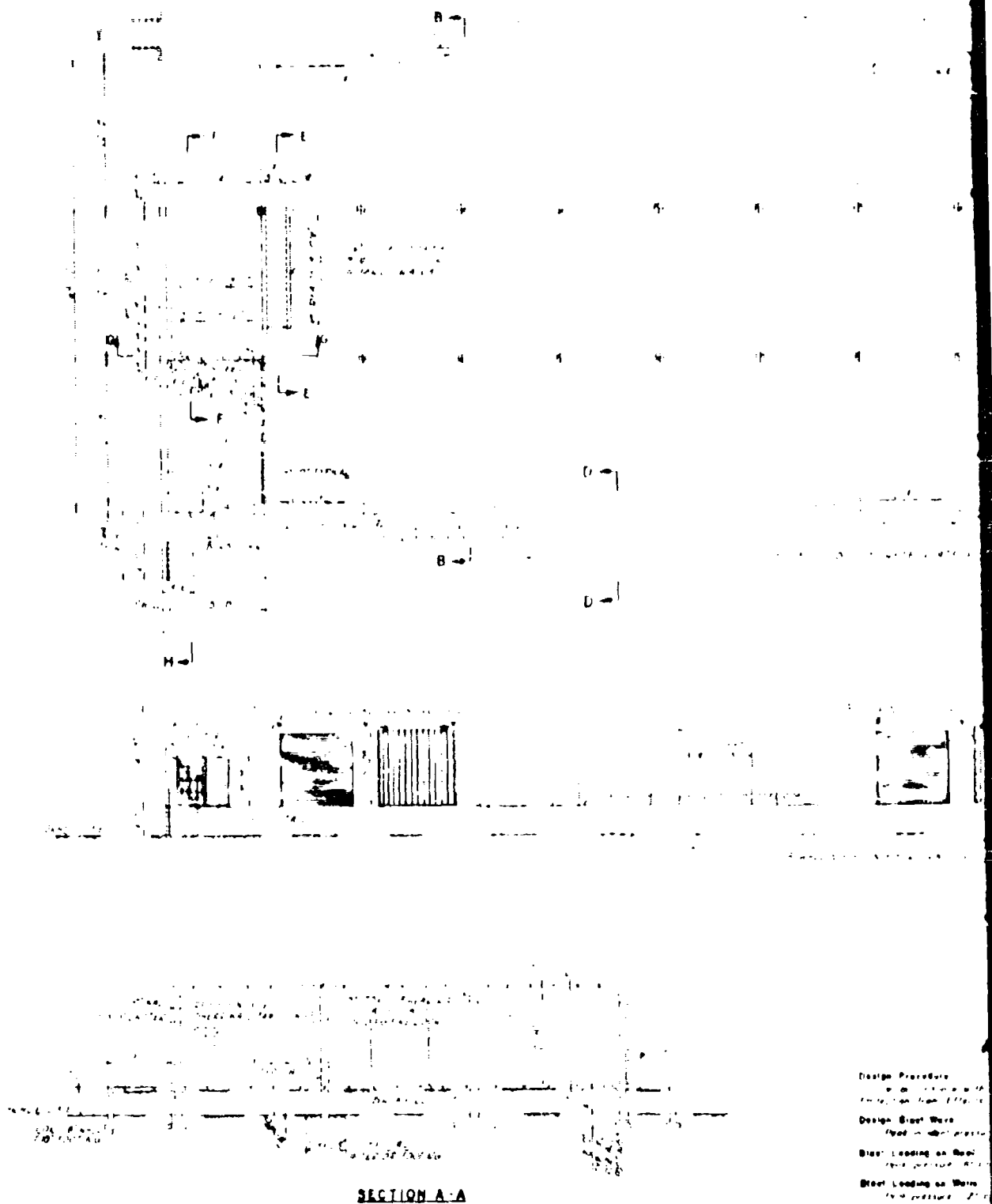


ELEVATION B  
SCALE 1/4" = 1'-0"

ELEVATION C  
SCALE 1/4" = 1'-0"







Design Procedure  
 in accordance with  
 American Institute of  
 Naval Architects  
 Design Boat Wave  
 Load in accordance with  
 Boat Loading on Hull  
 Load in accordance with  
 Boat Loading on Wave  
 Load in accordance with  
 Hulls, Radiation from  
 Hull, gunning and  
 warping of any position  
 and any other factor  
 Strength of Materials  
 in accordance with  
 the American Institute  
 of Naval Architects  
 and the American  
 Society of Mechanical  
 Engineers  
 Tested capacity of the

FLOOR PLAN

ELEVATION

NOTE

THE 2L AND 3L PSI WAREHOUSES HAVE SHEAR WALLS  
1' 4" AND 2' 0" THICK RESPECTIVELY ON COLUMN  
LINES 7 AND 12

Design Procedure

A. In accordance with ECE Manual, "Design of Structures for Protection from Effects of Atomic Weapons"

Design Blast Wave

Peak pressure = 100 psi Duration = 1.50 sec.

Blast Loading on Roof

Peak pressure = 100 psi Duration = 1.50 sec.

Blast Loading on Walls

Peak pressure = 25 psi Duration = 1.50 sec.

Nuclear Radiation Protection for Shelter Area

Interpenetration and neutron attenuation to be for a blast  
explosion of any position which will produce a peak blast  
pressure equal to 100 psi.

Strength of Materials

	Elastic	Steel Design
2000 lb./sq. in. (min.)	80,000 psi	100,000 psi
Concrete (f)	4,000 psi	5,000 psi
Reinforcing steel (f)	47,000 psi	52,000 psi
Structural steel (min. yield)	36,000 psi	46,000 psi

\* rated capacity of bar

Allowable Stresses and Deflections

Reinforced concrete walls and slabs designed to resist  
blast loading with design stress and blast shock  
loading for maximum elastic deformation under  
design blast load.

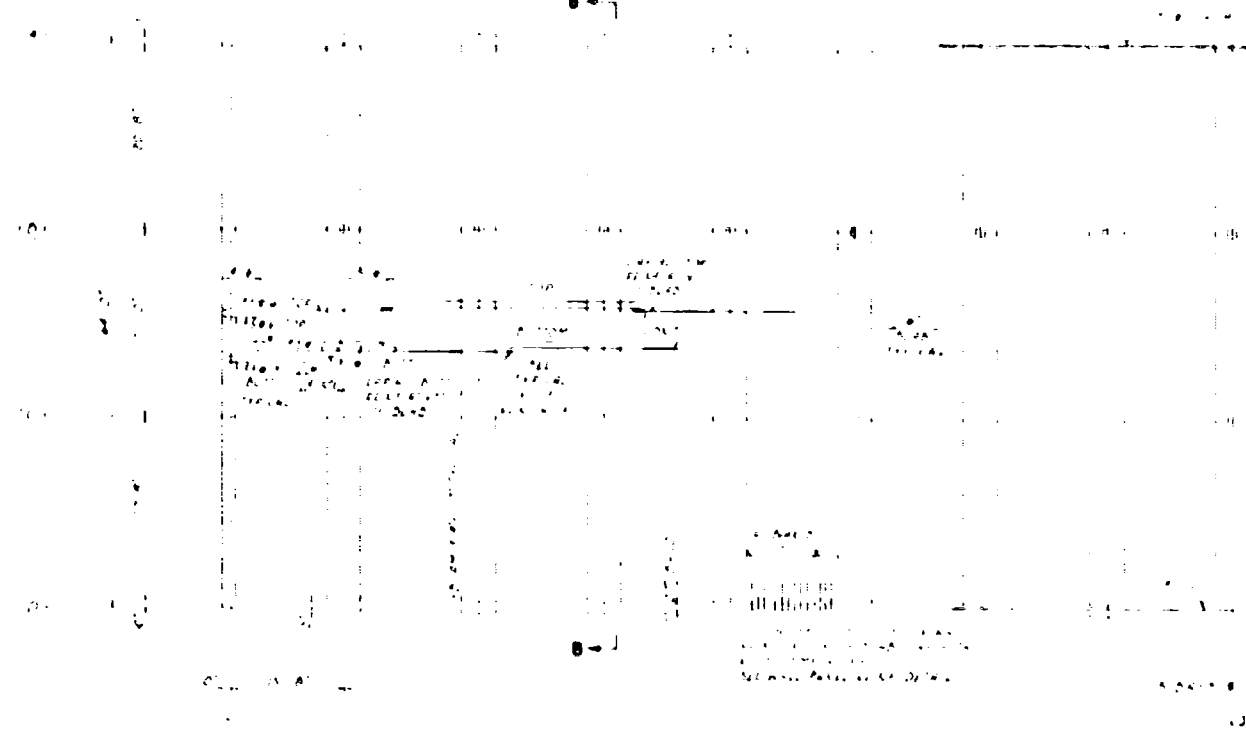
General Notes

1. The following features are not shown and  
shall be determined to suit use requirements.

2. The design shall be based upon Dept. of the  
Army, Office of the Chief of Engineers, No. 33 US District  
at Drawing No. 33 (1) OF.

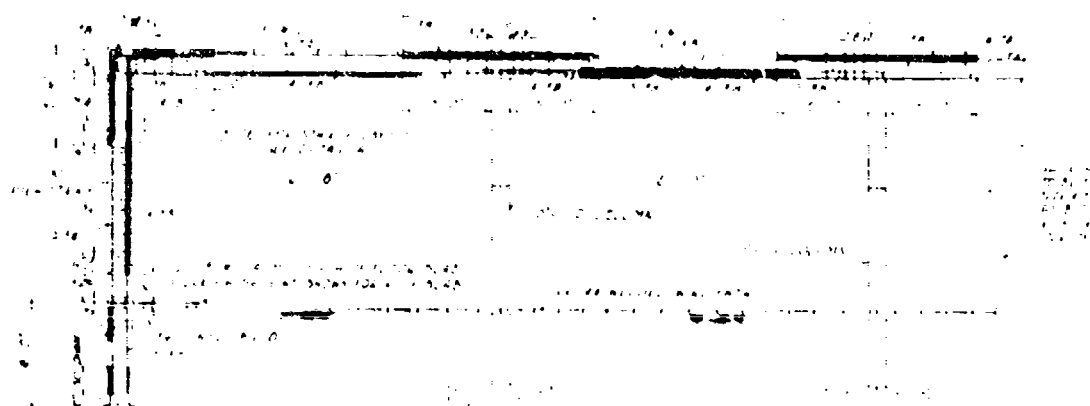
AMMANN & WHITNEY CONSULTING ENGINEERS 111 8TH AVENUE, NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.	
DESIGNED BY U. S.		PROJECT NO.	
CHECKED BY J. J.		DATE	
APPROVED BY J. J.		DATE	
FOR THE ARMY		FOR THE ARMY	
PROJECT NO.		PROJECT NO.	
DATE		DATE	
DRAWING NUMBER 60-17-01		DRAWING NUMBER 60-17-01	
SHEET 1 OF 3		SHEET 1 OF 3	

2



**ROOF FRAMING**

SCALE 1/4" = 1'-0"



**SECTION B-B**

SCALE 1/4" = 1'-0"

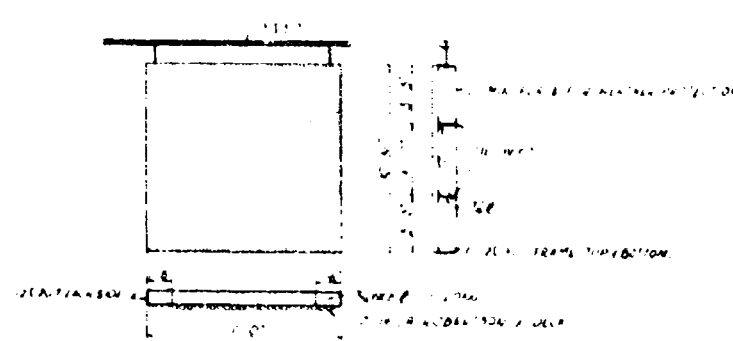
**TYPICAL HAUNCH**

NTB



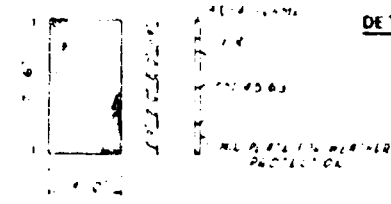
**DETAIL A (TYPICAL)**

SCALE 1/4" = 1'-0"



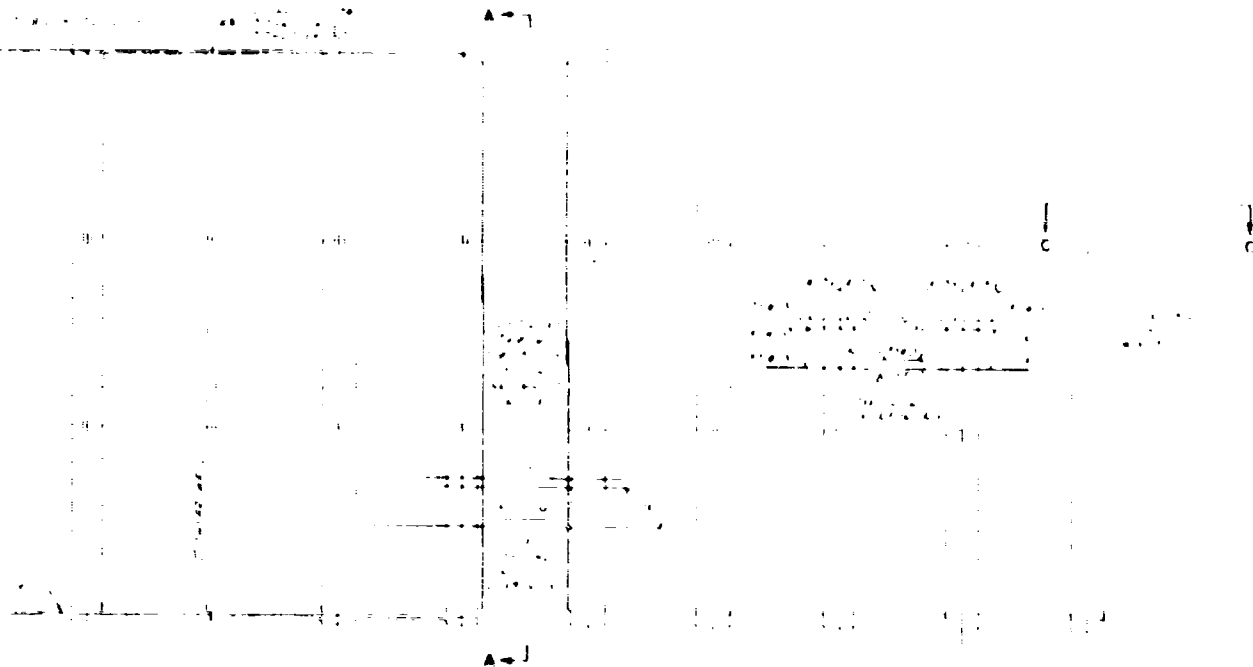
**DETAIL B (TYPICAL)**

SCALE 1/4" = 1'-0"



**DETAIL C**

SCALE 1/4" = 1'-0"

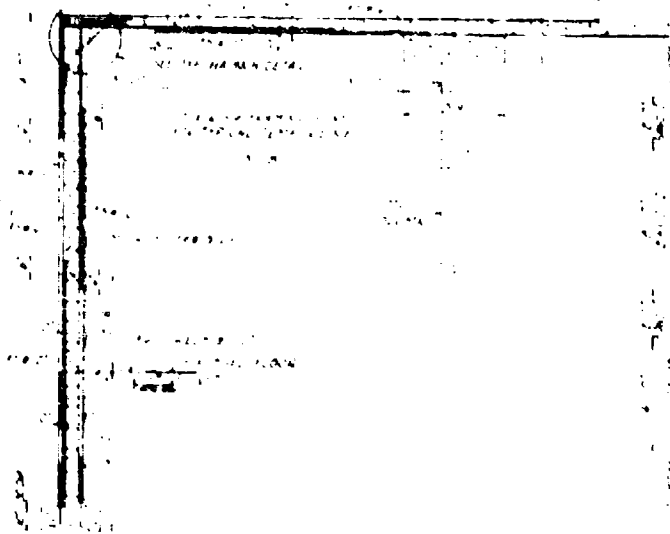


# **ROOF FRAMING PLAN**

SCALE:  $\frac{1}{4}'' = 1' - 0''$

## **TYPICAL HAUNCH DETAIL**

NTB



## **SECTION C-C**

SCALE:  $\frac{1}{4}'' = 1' - 0''$

## **FRONT WALL PANEL**

SCALE:  $\frac{1}{4}'' = 1' - 0''$

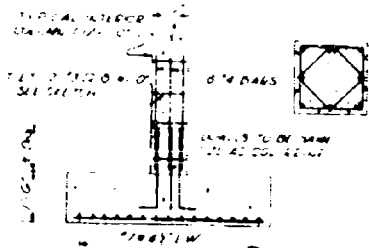
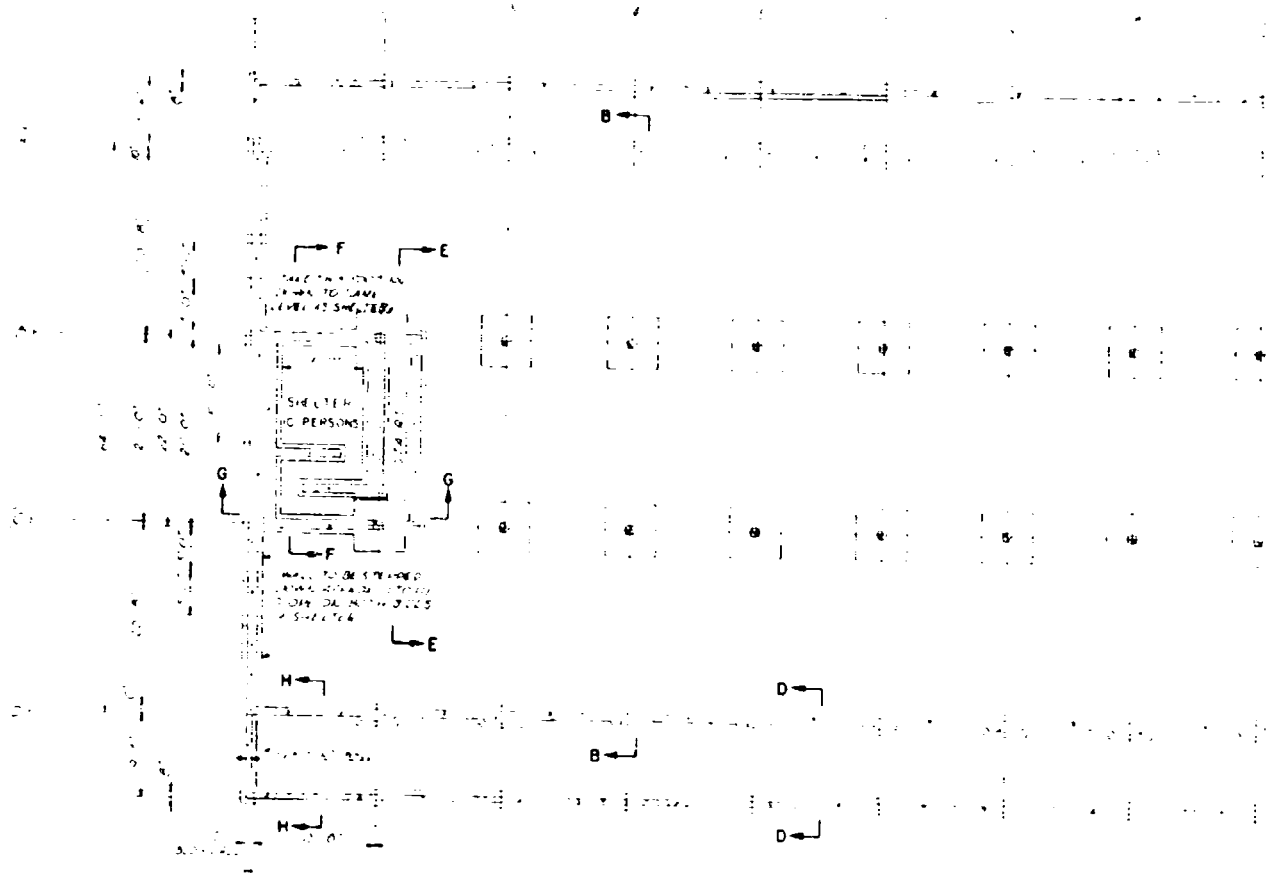
## **DETAIL A (TYPICAL)**

SCALE:  $\frac{1}{4}'' = 1' - 0''$

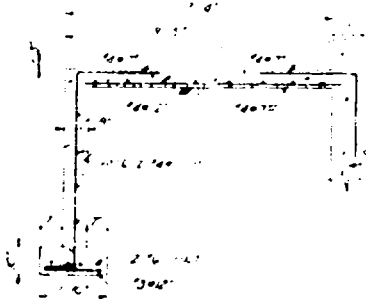


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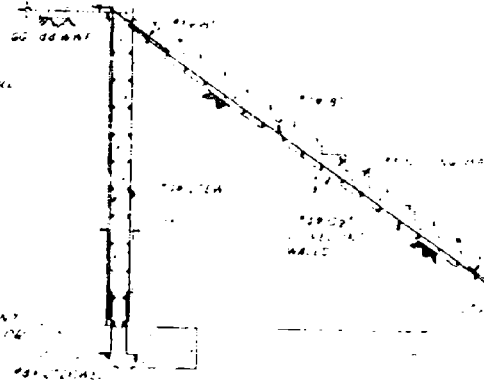
<b>AMMANN &amp; WHITNEY</b> 111 8TH AVENUE NEW YORK, N. Y.		DEPARTMENT OF THE ARMY ENGINEERING DIVISION	
DRAWN BY: [Signature] CHECKED BY: [Signature] DATE: MAY 1950		PROJECT: PROTECTIVE CONSTRUCTION BUILDING: WAREHOUSE LOCATION: EAST RESERVE, NY	
SCALE: $\frac{1}{4}'' = 1' - 0''$		SHEET: 60-17	



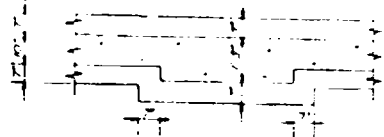
**TYPICAL INTERIOR COLUMN & FOOTING**  
SCALE: 1/4"=1'-0"



**SECTION D-D**  
SCALE: 1/4"=1'-0"



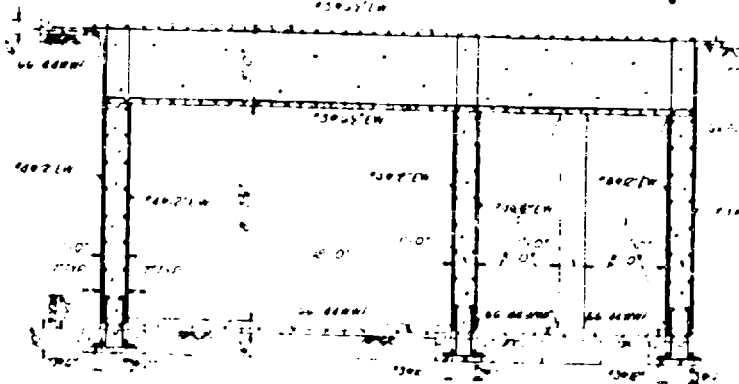
**SECTION E-E**  
SCALE: 1/4"=1'-0"



**DETAIL D**  
SCALE: 1/4"=1'-0"

TYPE	SIZE
1	10'0" x 8'0"
2	10'0" x 8'0"
3	10'0" x 8'0"
4	10'0" x 8'0"
5	10'0" x 8'0"
6	10'0" x 8'0"
7	10'0" x 8'0"
8	10'0" x 8'0"
9	10'0" x 8'0"
10	10'0" x 8'0"

STANDARD TYPE  
1000 Y. MODULE



**SECTION F-F**  
SCALE: 1/4"=1'-0"

**FOUNDATION PLAN**  
SCALE 1/4" = 1' 0"

**SECTION M-M**  
SCALE 1/4" = 1' 0"

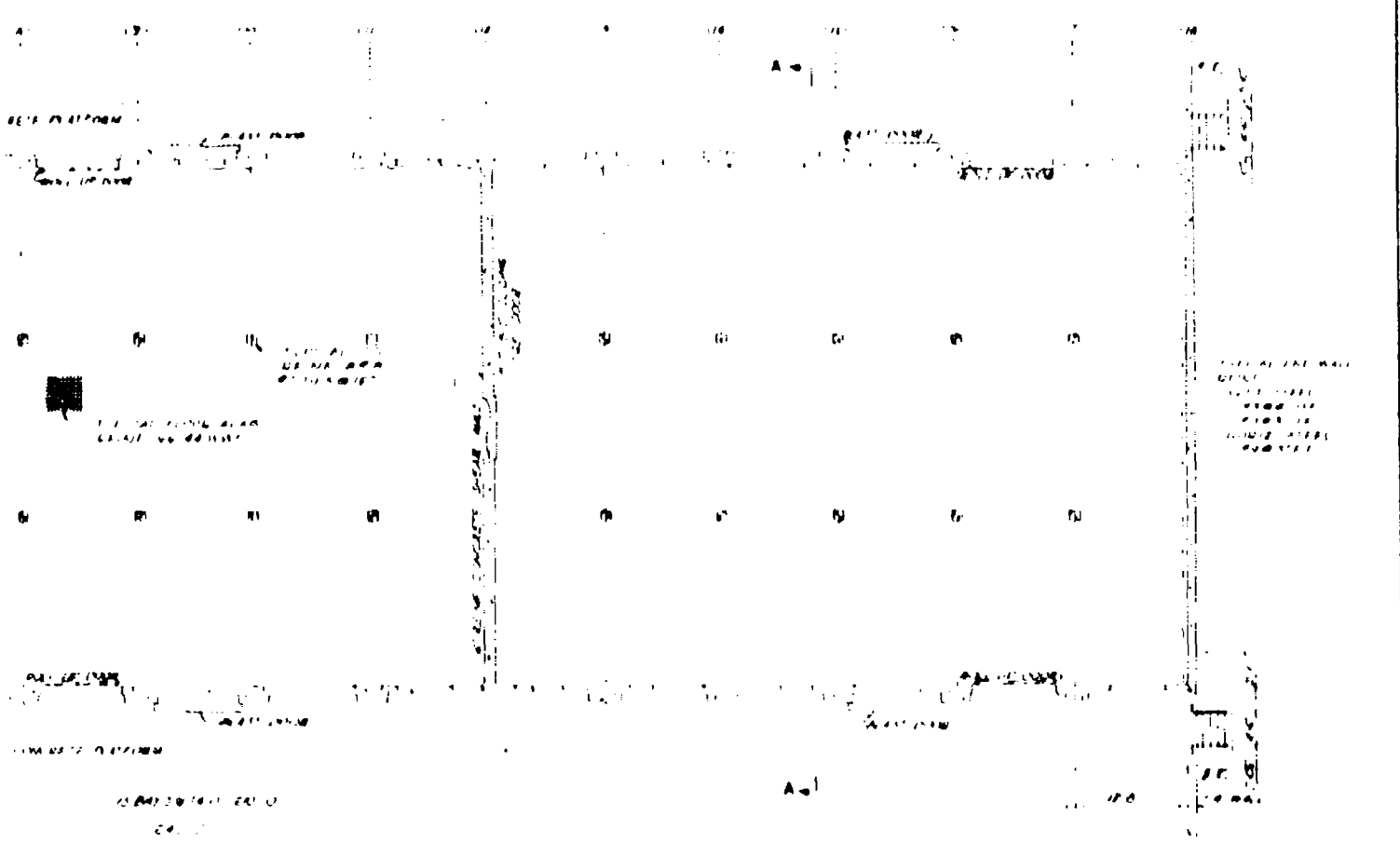
**SECTION E-E**  
SCALE 1/4" = 1' 0"

**SECTION G-G**  
SCALE 1/4" = 1' 0"

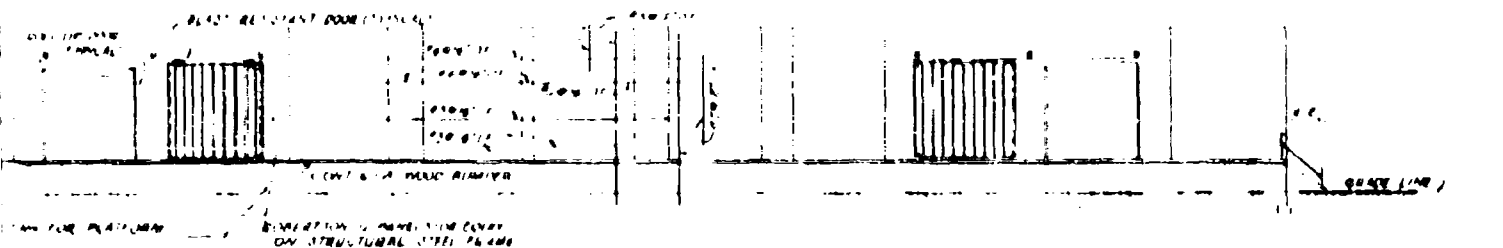
<b>AMMANN &amp; WHITNEY</b> 111 5TH AVENUE, NEW YORK, N. Y.		<b>DEPARTMENT OF THE ARMY</b> OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.	
DRAWN BY CHECKED BY DATE		<b>PROTECTIVE CONSTRUCTION WAREHOUSE</b> <b>10 PSI BLAST RESISTANT</b>	
PROJECT NO. DRAWING NO.		AS NOTED 60-17-01 SHEET 2 OF 2	

2





# FLOOR PLAN



# ELEVATION

## DESIGN CONDITIONS

### Design Procedure

In accordance with the standard design of a structure for Protection from the effects of Atomic Weapons Design Blast Wave

Peak incident pressure: 20 psi. Duration: 1/10 sec

Shall Loading on Roof

Shall Loading on Walls

Shall Loading on Walls

Shall Loading on Walls

Shall Loading on Walls

Shall Loading on Walls

Shall Loading on Walls

Shall Loading on Walls

Shall Loading on Walls

Shall Loading on Walls

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Shall Loading on Walls

Shall Loading on Walls

Shall Loading on Walls

Shall Loading on Walls

### Allowable Stresses and Deflections

In accordance with the standard design of a structure for Protection from the effects of Atomic Weapons Design Blast Wave

Peak incident pressure: 20 psi. Duration: 1/10 sec

The following features are not shown and shall be determined by the user's requirements

Shall Loading on Roof

Shall Loading on Walls

Shall Loading on Walls

Shall Loading on Walls

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Shall Loading on Walls

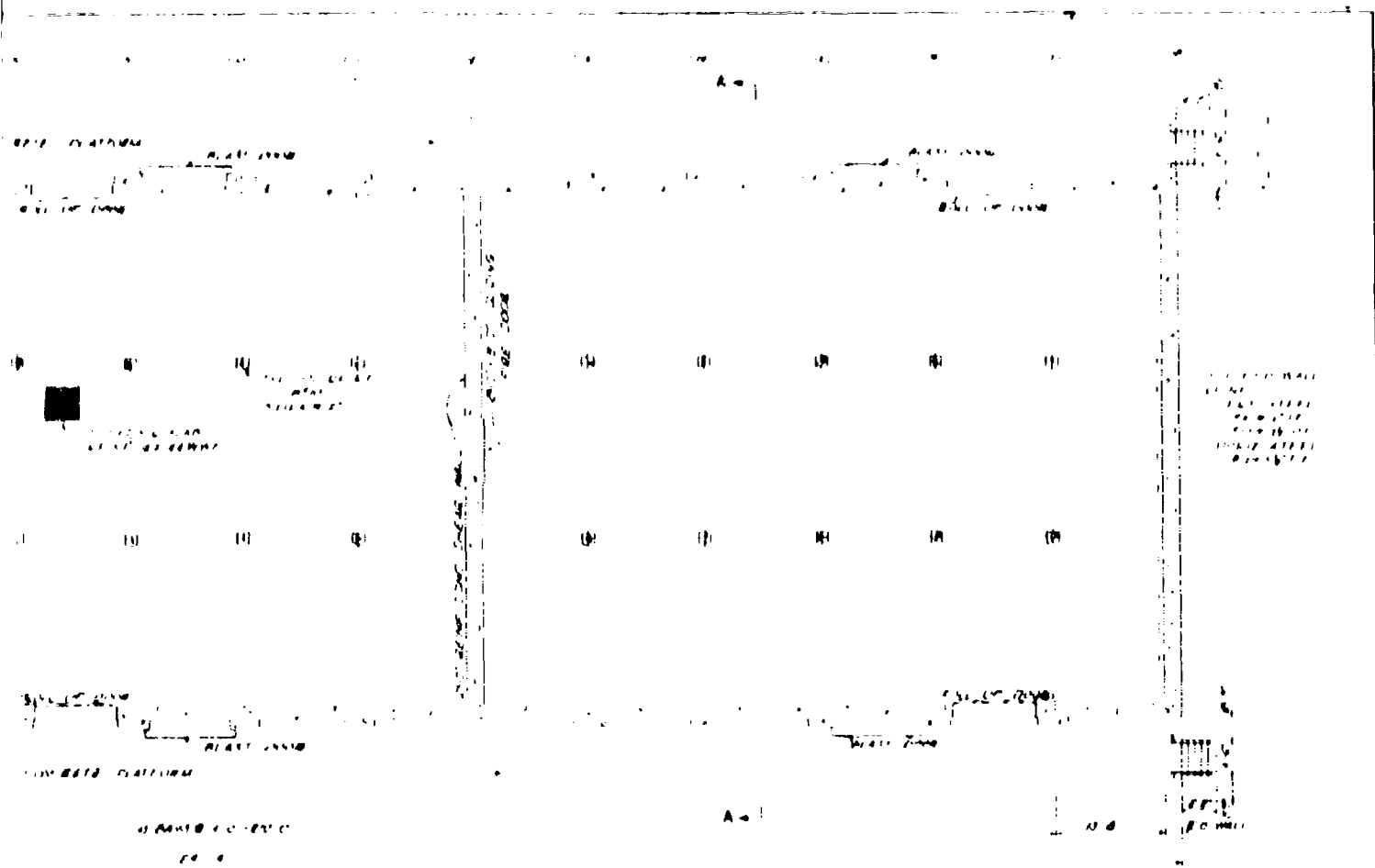
Shall Loading on Walls

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PROJECT NO. _____ DRAWING NO. _____ SCALE _____ DATE _____		<b>PROTECTIVE CONSTRUCTION</b> <b>WAREHOUSE</b> <b>20 PSI BLAST RESISTANT</b>	
DESIGNED BY _____ CHECKED BY _____ APPROVED BY _____ DATE _____		DRAWN BY _____ CHECKED BY _____ APPROVED BY _____ DATE _____	
DATE _____ BY _____		DATE _____ BY _____	

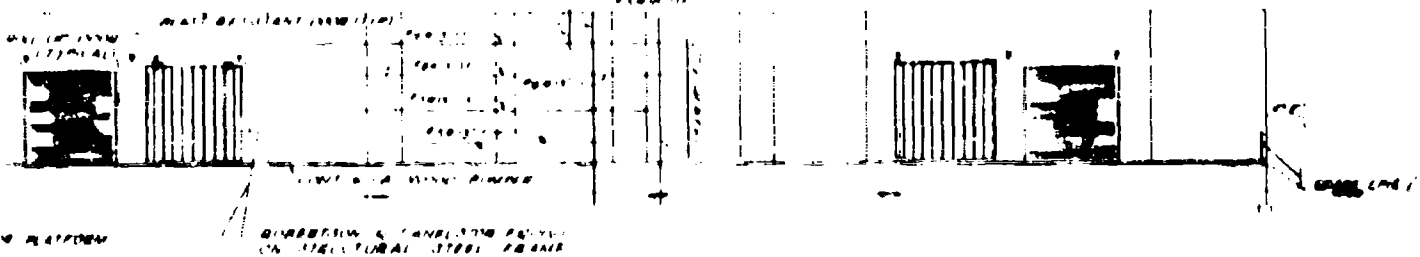
2







# FLOOR PLAN



## ELEVATION

### DESIGN CONDITIONS

**Design Procedure**  
 In accordance with the manual Design of Structures  
 - Protection from Effects of Atomic Weapons

**Design Data**  
 Post warhead pressure - 80 psi Duration - 0.8 sec

**Load on Roof**  
 Post warhead pressure - 80 psi Duration - 0.8 sec

**Load on Wall**  
 Post warhead pressure - 80 psi Duration - 0.8 sec

**Reinforcement Protection for Exterior Area**  
 Reinforcement and column arranged in 50' by 5'  
 at a depth of 10' from the wall and provided a  
 for best protection against fire

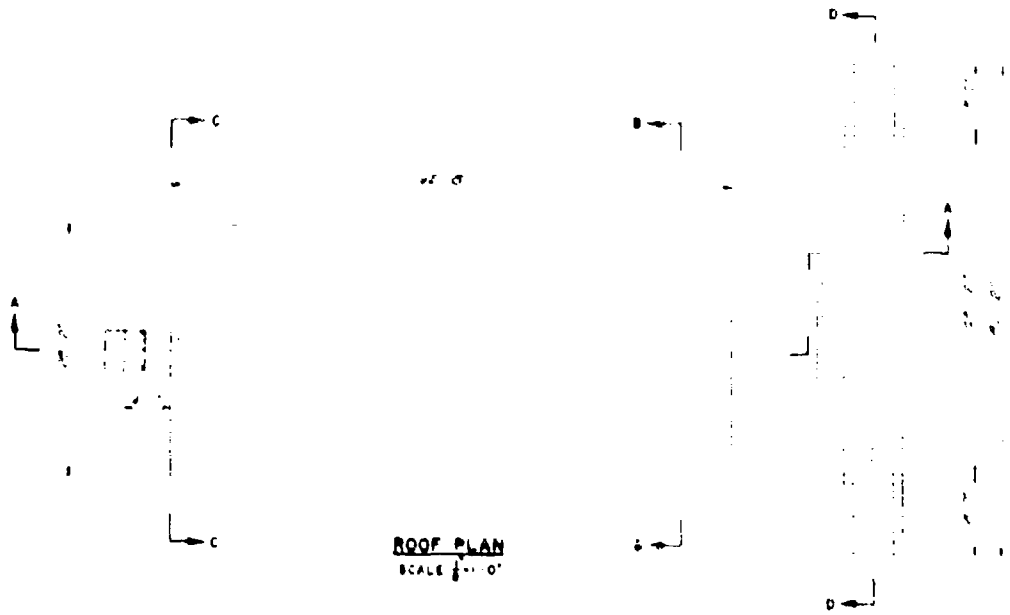
**Design of Materials**  
 Steel - 50 ksi  
 Reinforcement - 60,000 psi  
 Concrete - 4,000 psi  
 and Steel reinforcement 40,000 psi  
 of Grade 60 and 50 ksi  
 Reinforcement 60,000 psi 40,000 psi  
 and 50 ksi

**Allowable Stresses and Deflections**  
 Steel, concrete, reinforcement and fastenings designed to provide  
 distribution under design loads. Steel reinforcement designed  
 for maximum positive deflection under design loads.

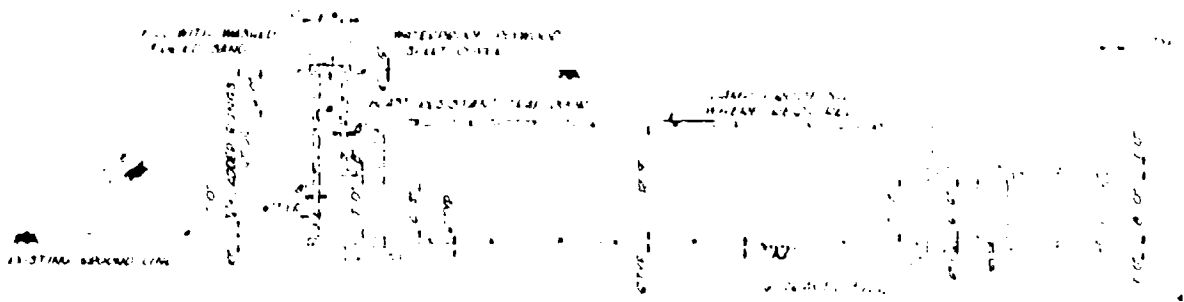
**General Notes**  
 1. The following materials are not shown and shall  
 be determined by the user (equipment)  
 2. Details and dimensions of fastenings  
 3. Details of reinforcement and fastenings shall be  
 determined by the user (equipment) and shall be  
 determined by the user (equipment)

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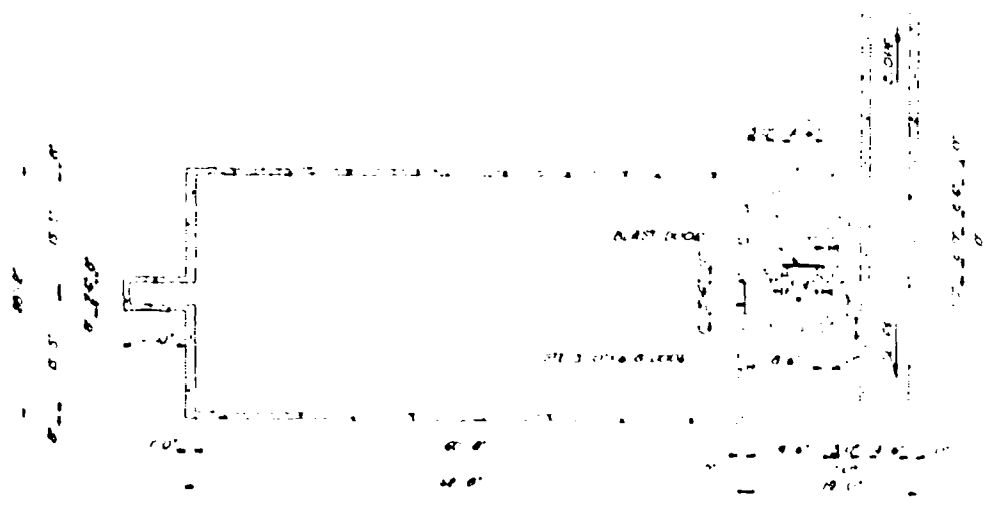
AMMANN & WHITNEY		DEPARTMENT OF THE ARMY	
111 5TH AVENUE NEW YORK, N. Y.		MILITARY CONSTRUCTION ENGINEERING DIVISION	
DESIGNED BY		CHECKED BY	
DRAWN BY		DATE	
PROJECT NO.		SHEET NO.	
<b>PROTECTIVE CONSTRUCTION</b> <b>WAREHOUSE</b> <b>50 PSI BLAST RESISTANT</b>			
DATE		SHEET	



**ROOF PLAN**  
SCALE 1/4" = 1'-0"



**SECTION A-A**  
SCALE 1/4" = 1'-0"



**FLOOR PLAN**  
SCALE 1/4" = 1'-0"

# DESIGN CONDITIONS

## Design Procedure

The structure was designed in accordance with the provisions of the ACI Code for reinforced concrete structures for blast loads from the effects of direct hit by a nuclear weapon.

## Design Blast Wave

The design blast wave was based on the results of tests conducted by the U.S. Army.

## Blast Loading on Arch Surface

The blast loading on the arch surface was based on the results of tests conducted by the U.S. Army.

## Nuclear Radiation Protection

The structure was designed to provide protection against nuclear radiation for a period of 30 days following a direct hit by a nuclear weapon.

## Strength of Materials

	Static	Blast Design
Concrete	4,000 psi	6,000 psi
Reinforcing Steel	50,000 psi	60,000 psi
Structural Steel	50,000 psi	60,000 psi

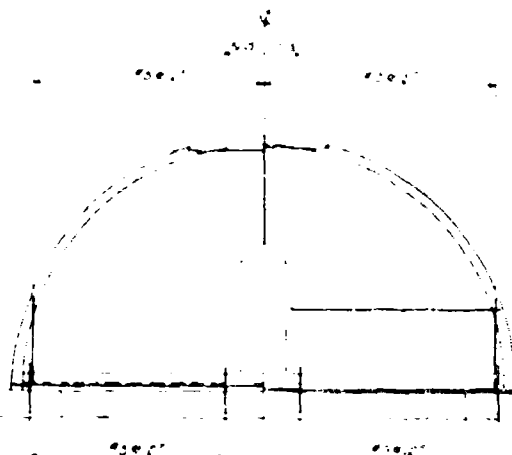
## Allowable Stresses and Deflections

The structure and walls and entrance was designed for plastic deflection under blast loads. A design for plastic deflection was used for the design of the structure. The design for plastic deflection was based on the results of tests conducted by the U.S. Army.

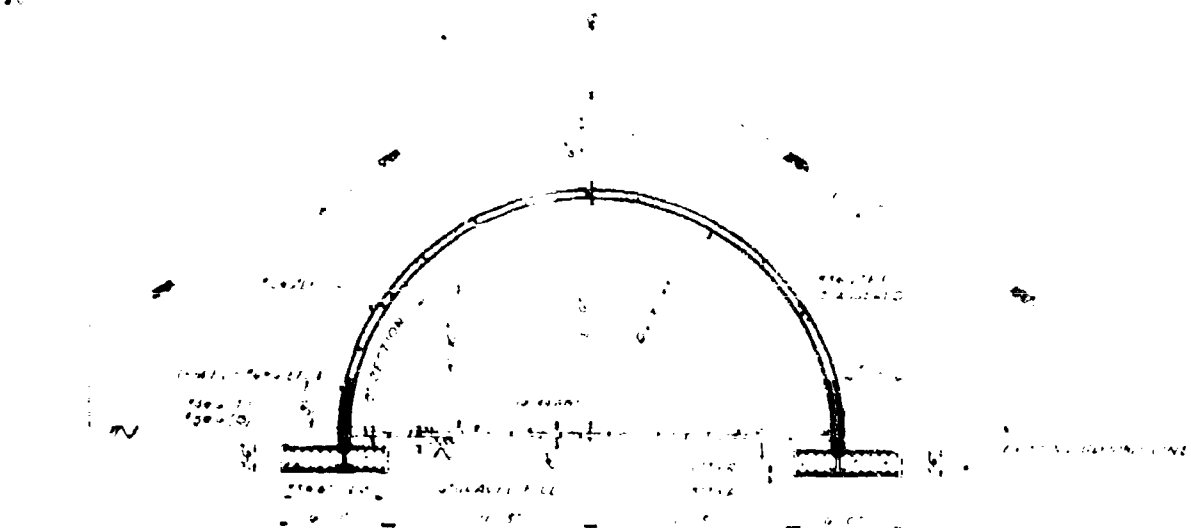
## General Notes

The structure was designed for blast loads from a direct hit by a nuclear weapon. The design for blast loads was based on the results of tests conducted by the U.S. Army.

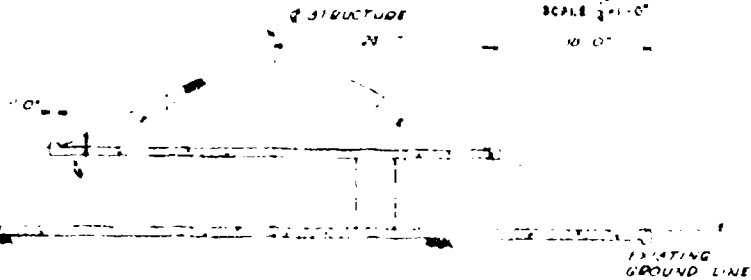
The structure was designed for blast loads from a direct hit by a nuclear weapon. The design for blast loads was based on the results of tests conducted by the U.S. Army. The structure was designed for blast loads from a direct hit by a nuclear weapon. The design for blast loads was based on the results of tests conducted by the U.S. Army.



SECTION C-C  
SCALE 1/4"=1'-0"

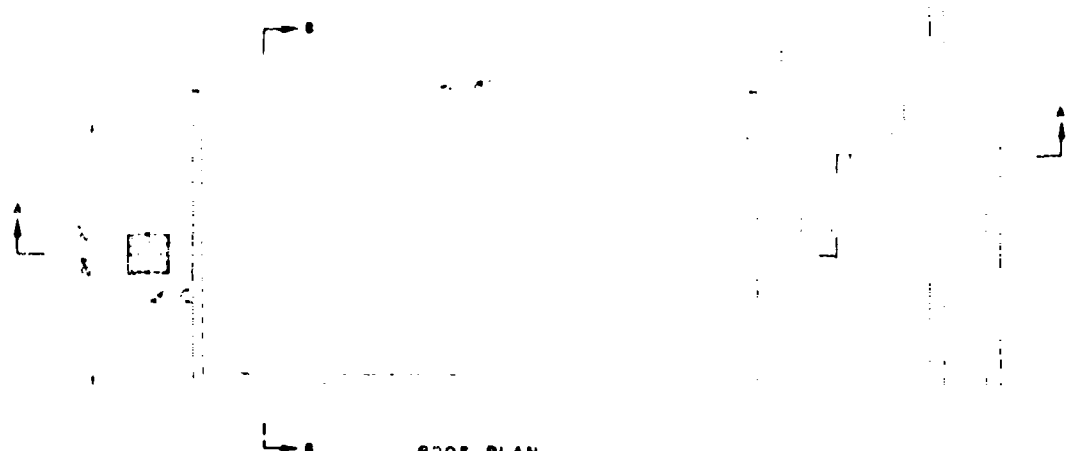


SECTION B-B  
SCALE 1/4"=1'-0"

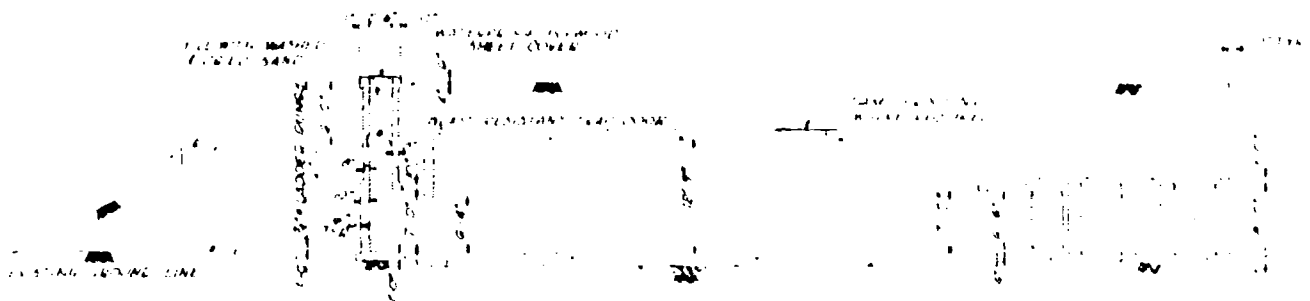


SECTION D-D  
SCALE 1/4"=1'-0"

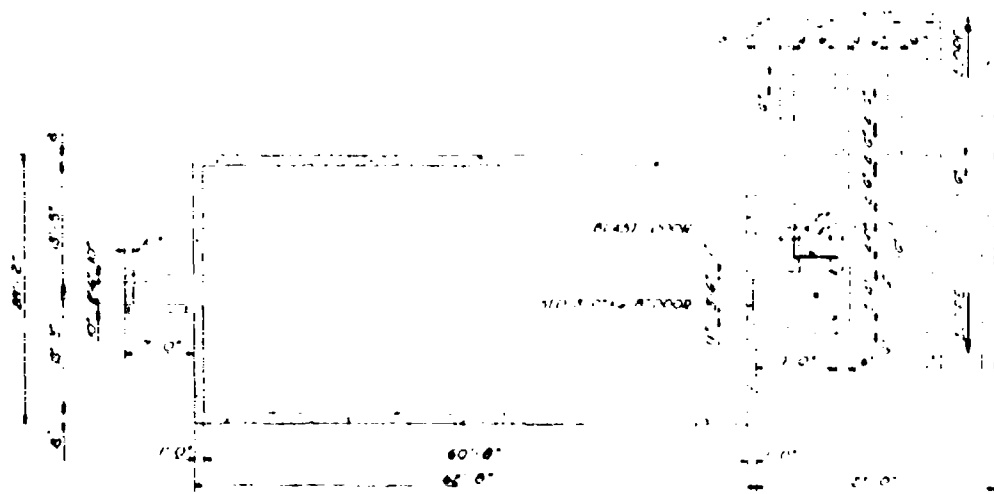
<b>AMMANN &amp; WHITNEY</b> CONSULTING ENGINEERS 111 8TH AVENUE, NEW YORK, N. Y.		<b>DEPARTMENT OF THE ARMY</b> OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.	
DRAWN BY: F.W. CHECKED BY: L.S. DATE: 6-17-62		<b>PROTECTIVE CONSTRUCTION</b> <b>EARTH COVERED</b> <b>CONCRETE IGLOO MAGAZINE</b> <b>25 PSI BLAST RESISTANT</b>	
PROJECT NO. 60-17-02		DRAWING NUMBER <b>60-17-02</b>	



**ROOF PLAN**  
SCALE 1/4" = 1'-0"



**SECTION A-A**  
SCALE 1/4" = 1'-0"



**FLOOR PLAN**  
SCALE 1/4" = 1'-0"

# DESIGN CONDITIONS

## Design Procedure

The structure will be designed to resist the effects of atomic weapons.

## Design Blast Wave

Peak overpressure of 500 psi, duration of 0.05 sec.

## Blast Loading on Arch Surface

Pressure of 500 psi.

## Nuclear Radiation Protection

Design for a radiation dose of 1000 rads per hour for a period of 1 hour.

## Strength of Materials

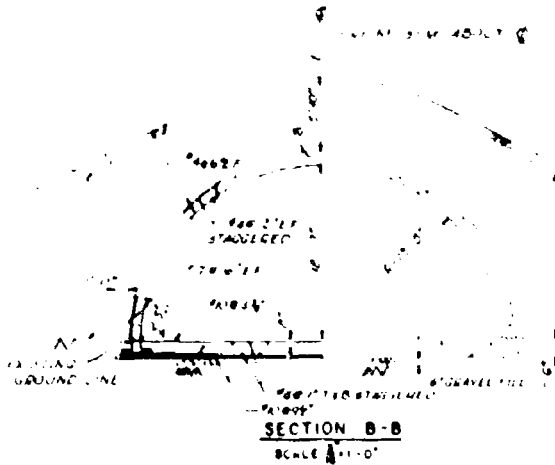
	Static	Blast Design
Concrete	4000 psi	6000 psi
Reinforcing Steel	40,000 psi	60,000 psi
Structural Steel	36,000 psi	50,000 psi
Welding	70,000 psi	90,000 psi

## Allowable Stresses and Deflections

The structure will be designed to resist the effects of atomic weapons. The design will be based on the assumption that the structure will be subjected to a blast wave of 500 psi peak overpressure and a duration of 0.05 sec. The structure will be designed to resist the effects of nuclear radiation.

## General Notes

- The structure will be designed to resist the effects of atomic weapons.
- The structure will be designed to resist the effects of nuclear radiation.
- The structure will be designed to resist the effects of blast waves.
- The structure will be designed to resist the effects of blast waves.
- The structure will be designed to resist the effects of blast waves.



AMMANN & WHITNEY CONSULTING ENGINEERS 111 8TH AVENUE NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION	
PROJECT NO. 60-17-02		PROJECT NAME: PROTECTIVE CONSTRUCTION EARTH COVERED CONCRETE 10000 MAGAZINE 50 PSI BLAST RESISTANT	
DATE: 6-17-62		DRAWN BY: [Signature]	
CHECKED BY: [Signature]		APPROVED BY: [Signature]	
DATE: 6-17-62		SHEET: 1 OF 1	

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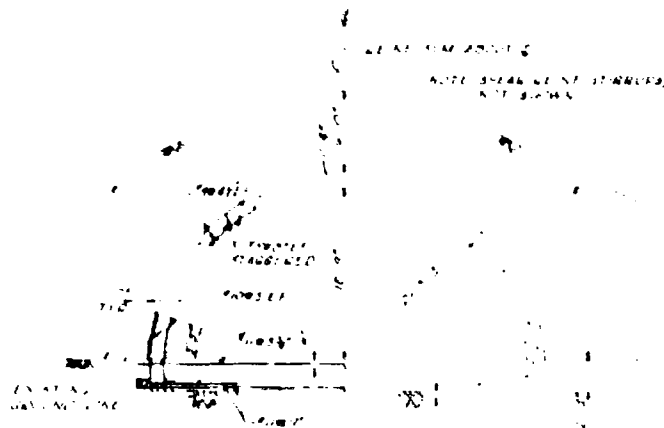
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SECTION D-D  
SCALE 1/4" = 1' 0"

### Design Procedure

The structure will be designed to resist the effects of the following loads:

### Design Blast Wave

The structure will be designed to resist the effects of the following loads:

### Blast Loading on Arch Surface

The structure will be designed to resist the effects of the following loads:

### Nuclear Radiation Protection

The structure will be designed to resist the effects of the following loads:

### Strength of Materials

The structure will be designed to resist the effects of the following loads:

### Allowable Stresses and Deflections

The structure will be designed to resist the effects of the following loads:

### General Notes

- The structure will be designed to resist the effects of the following loads:
- The structure will be designed to resist the effects of the following loads:
- The structure will be designed to resist the effects of the following loads:
- The structure will be designed to resist the effects of the following loads:

Material	Design
Concrete	100 PSI
Steel	36,000 PSI
Reinforcing Steel	60,000 PSI

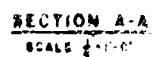
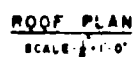
Load	Design
Blast	100 PSI
Radiation	100 PSI
Seismic	100 PSI

Material	Design
Concrete	100 PSI
Steel	36,000 PSI
Reinforcing Steel	60,000 PSI

2

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DRAWN BY CHECKED BY APPROVED BY DATE	FOR L.S. L.S. L.S. L.S.	<b>PROTECTIVE CONSTRUCTION</b> <b>EARTH COVERED</b> <b>CONCRETE IGLOO MAGAZINE</b> <b>100 PSI BLAST RESISTANT</b>	SHEET NO. 1 OF 1 DATE: MAY 1950





# DESIGN CONDITIONS

## Design Procedure

In accordance with OCE manual, "Design of Structures for Protection from the Effects of Atomic Weapons"

## Design Blast Wave

Peak incident pressure = 200psi; Duration = 0.45 sec

## Blast Loading on Arch Surface

Peak pressure = 4.2 psi

## Nuclear Radiation Protection

Total gamma and neutrons attenuated to 50r/hr for a 500KT weapon at 100 yards, which will produce a peak blast pressure equal to 200psi

## Strength of Materials

Supporting capacity  
Concrete, fc  
Rein. steel, lower yield  
1st Grade, ASTM A305-50T  
1st Grade steel, lower yield  
(ASTM A7-50)  
Plated capacity of soil

## Static

8,000psi  
5,000psi  
47,000psi  
30,000psi

## Blast Design

16,000psi  
6,000psi  
52,000psi  
41,600psi

## Allowable Stresses and Deflections

The foundation, end walls and entrance may be designed for plastic deformation under design blast load Arch designed for maximum allowable horizontal deflection at crown equal to R/50 Blast door and escape hatch door designed for maximum elastic deformation under design blast load

## General Notes

1. The following features are not shown and shall be determined to suit use requirements

Interior partitions

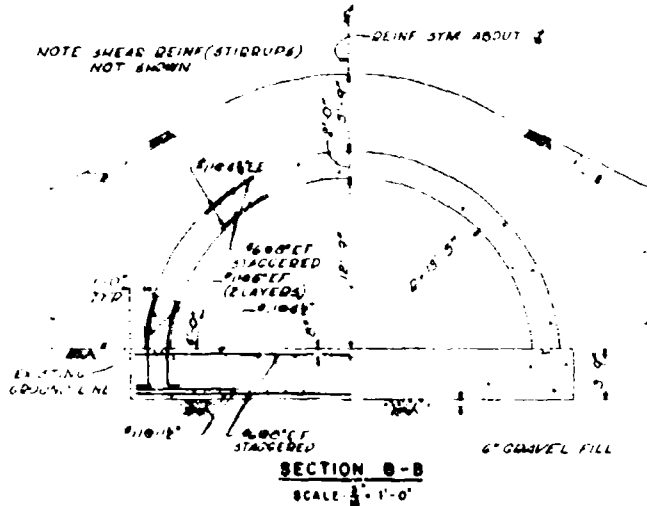
Mechanical and electrical equipment

Air locks and decontamination facilities

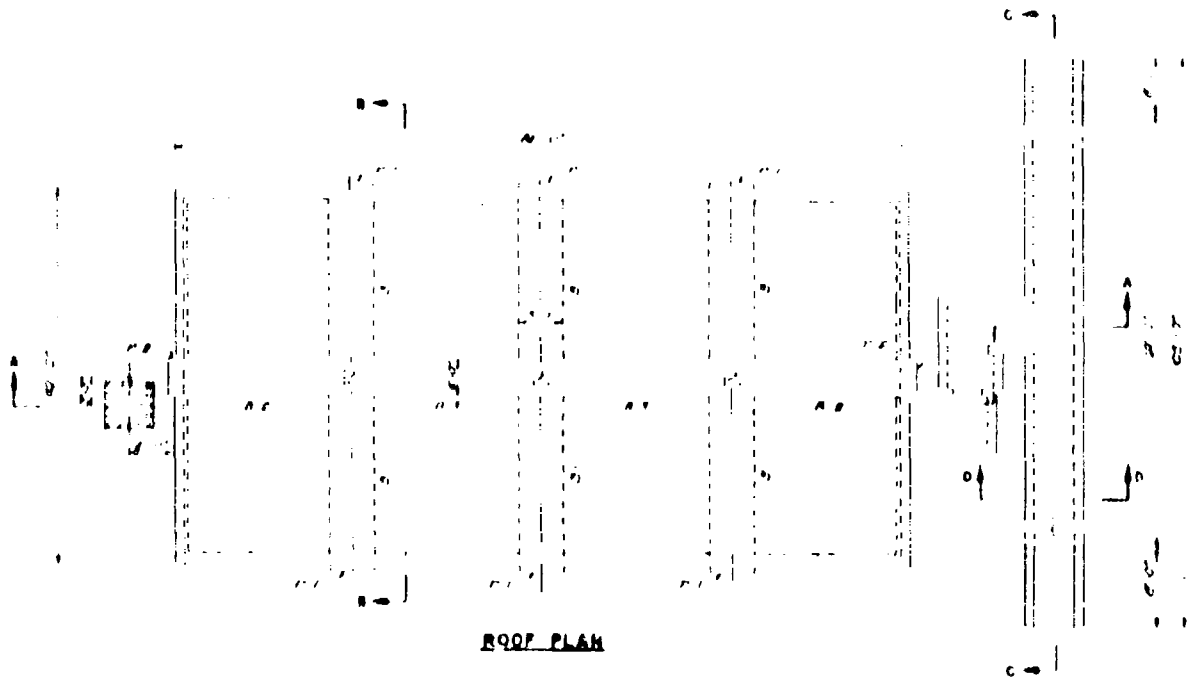
2. Access ramps may be provided if required for vehicles

3. Thermal protection to be applied to all exterior doors

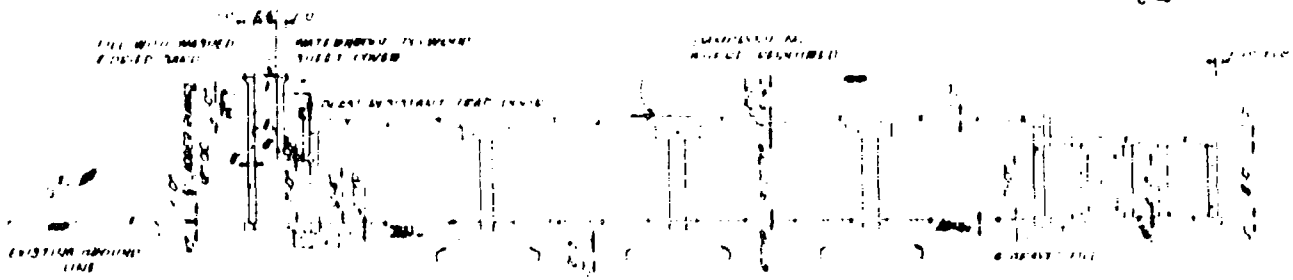
4. Structure may be lowered to balance cut and fill if desired



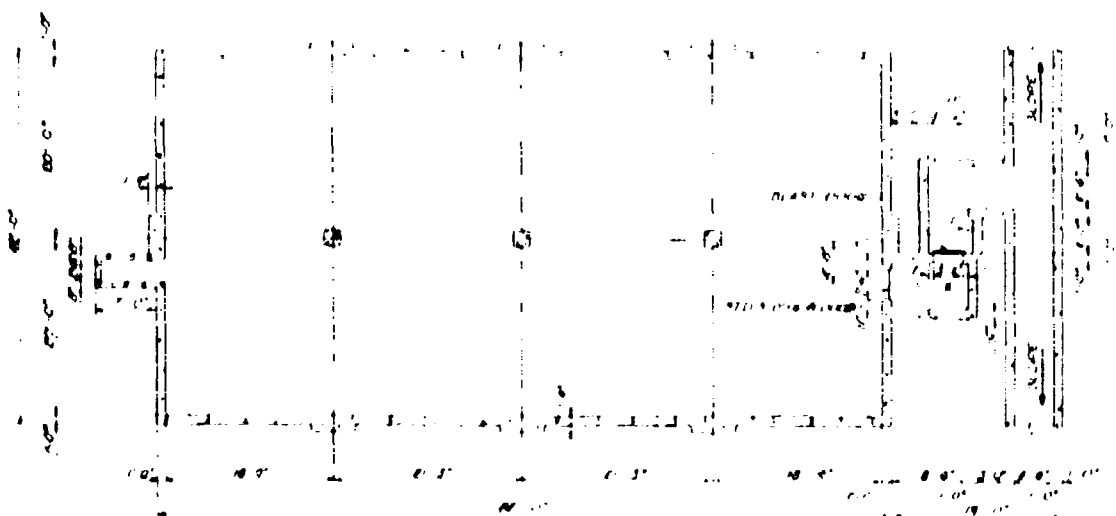
APPROVED		DATE	DESCRIPTION	BY	APPROVED
AMMANN & WHITNEY		DEPARTMENT OF THE ARMY			
CONSULTING ENGINEERS		OFFICE OF THE CHIEF OF ENGINEERS			
111-6TH AVENUE, NEW YORK, N. Y.		HEAVY CONSTRUCTION ENGINEERING DIVISION			
DRAWN BY		CHECKED BY			
F.J.M.		S.P.M.			
DESIGNED BY		CHECKED BY			
S.P.M.		S.P.M.			
APPROVED		APPROVED			
DATE		DATE			
DEC 1950		DEC 1950			
PROJECT		PROJECT			
200 PSI BLAST RESISTANT		200 PSI BLAST RESISTANT			
AS NOTED		AS NOTED			
DRAWING NUMBER		DRAWING NUMBER			
60-17-02		60-17-02			
SHEET		SHEET			
1 OF 1		1 OF 1			



ROOF PLAN



SECTION A-A



FLOOR PLAN

# DESIGN CONDITIONS

Design Procedure  
in accordance with DCE manual, "Design of Structures for Protection  
from the Effects of Atomic Weapons"

Design Blast Wave  
Peak incident pressure = 25psi Duration = 1.2 sec

Blast Loading on Roof and Walls  
Peak pressure = 25psi Duration = 1.2 sec

Nuclear Radiation Protection  
Total gamma and neutron attenuated to 50% for a 30KT weapon  
at any position which will produce a peak blast pressure not less than 25psi

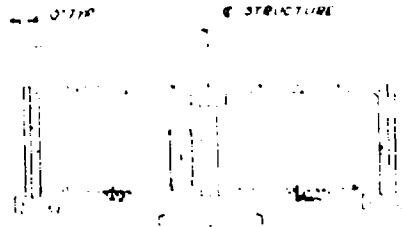
Strength of Materials	Static	Blast Design
Soil bearing capacity	4,000psi	16,000psi
Concrete, f <sub>c</sub>	4,000psi	5,000psi
Reinforcing steel, yield point	47,500psi	52,000psi
(for Grade ASTM A7-50T)		
Structural steel, yield point	38,000psi	41,600psi
(ASTM A7-50)		
Tensile capacity of soil		

## Allowable Stresses and Deflections

Max. stress, deflection and end deflection may be designed for plastic  
deformation under design blast load. Blast door and escape hatch  
may be designed for maximum elastic deformation under design blast  
load.

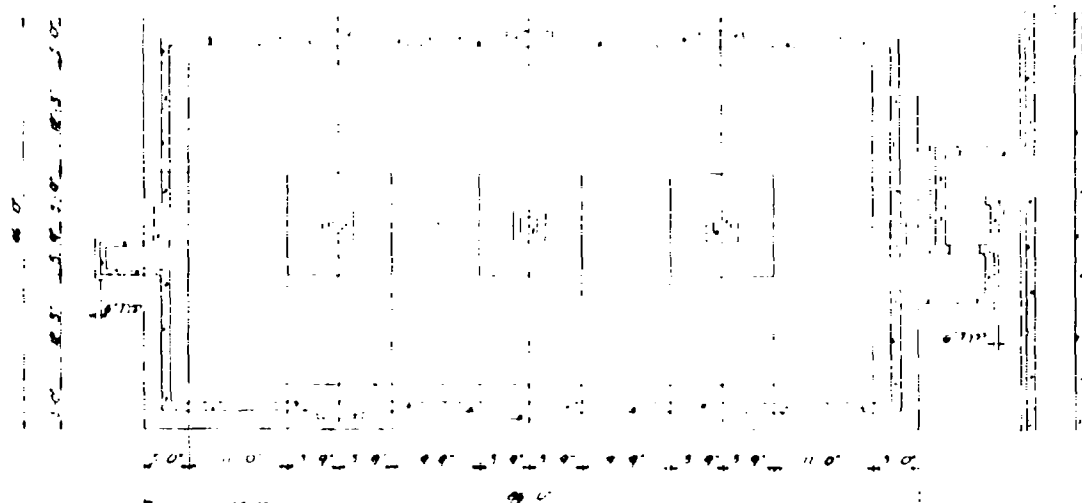
## General Notes

- The following features are not shown and shall be determined to  
meet use requirements:  
Interior partitions  
Mechanical and electrical equipment  
Air locks and decontamination facilities
- Access may be provided if required for vehicles
- Structure may be covered to eliminate dust and fuel if desired



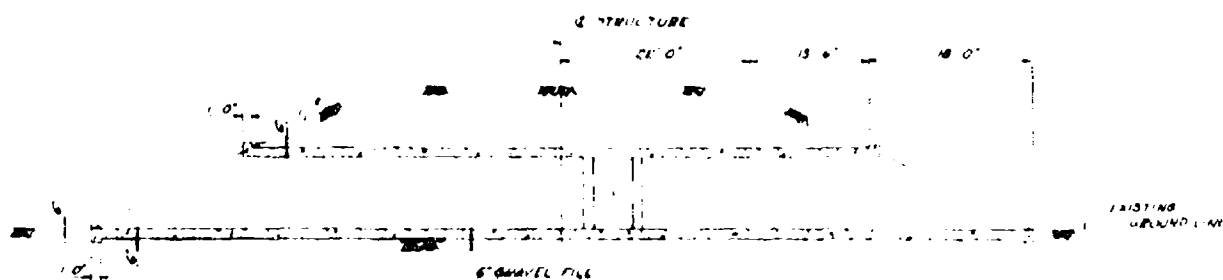
SECTION 9-9

AMMANN & WHITNEY 111 6TH AVENUE NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.	
DESIGNED BY J. S.		<b>PROTECTIVE CONSTRUCTION GENERAL PURPOSE STRUCTURE EARTH COVERED, RECTANGULAR 25 PSI BLAST RESISTANT</b>	
CHECKED BY N. O.			
DATE JAN 1950			
BY J. S.			
SCALE 1/4" = 1'-0"		DRAWING NUMBER 60-18-01	
DATE DEC 1950		SHEET 1 OF 2	



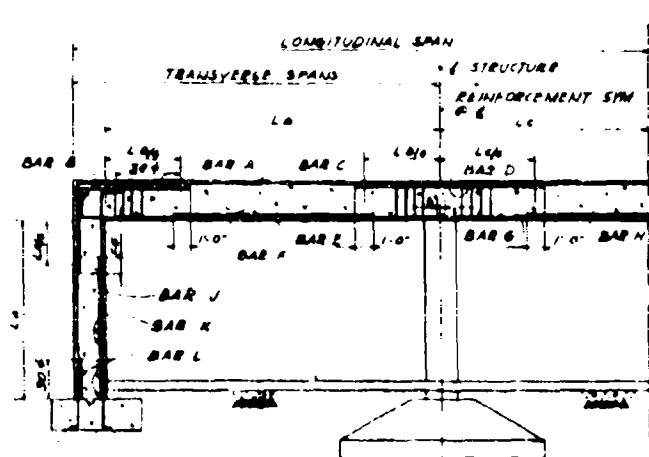
**FOUNDATION PLAN**

SCALE:  $\frac{1}{4}" = 1'-0"$



**SECTION C-C**

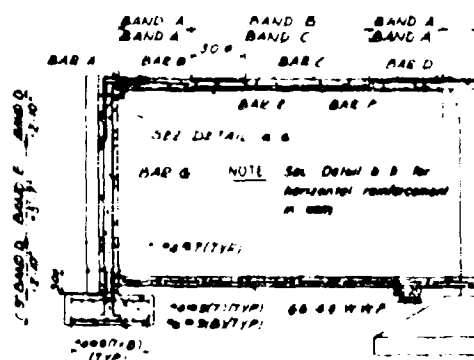
SCALE:  $\frac{1}{4}" = 1'-0"$



**TYPICAL BEAM & PILASTER DETAIL**

SCALE:  $\frac{1}{4}" = 1'-0"$

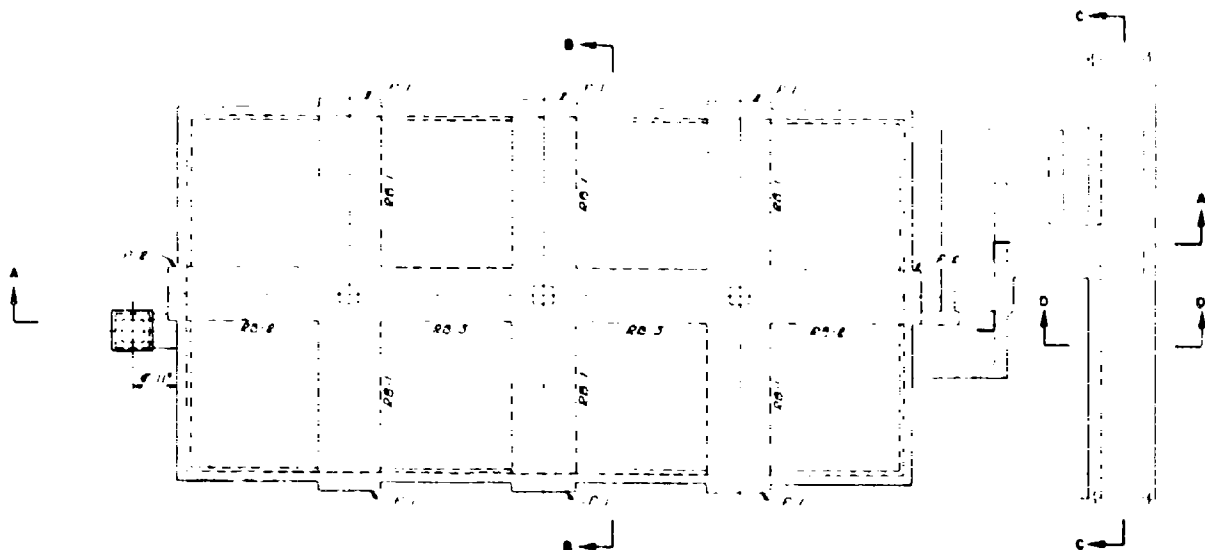
INT. BAY REINFORCEMENT SYM D & E IN INTERIOR BAYS



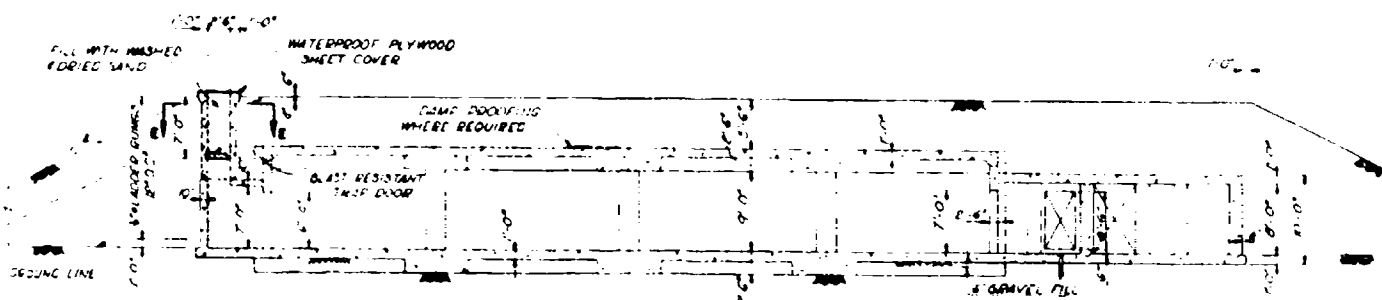
**TYPICAL ROOF & WALL DETAIL**

SCALE:  $\frac{1}{4}" = 1'-0"$

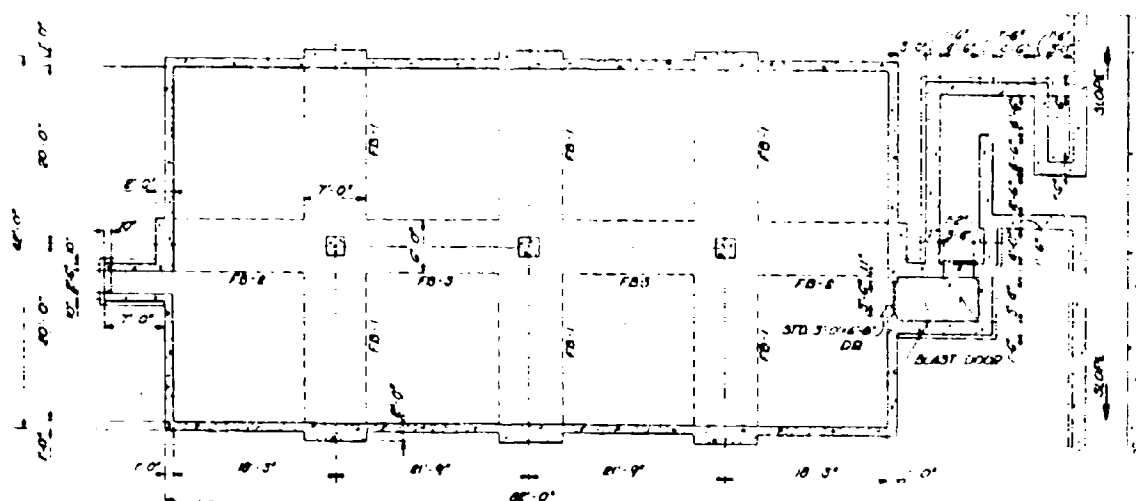




**ROOF PLAN**



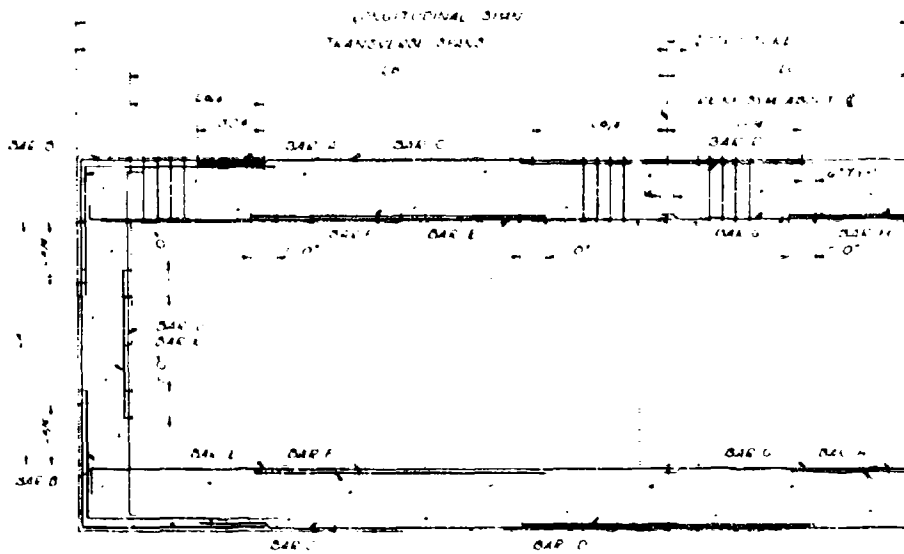
**SECTION A-A**



**FLOOR PLAN**

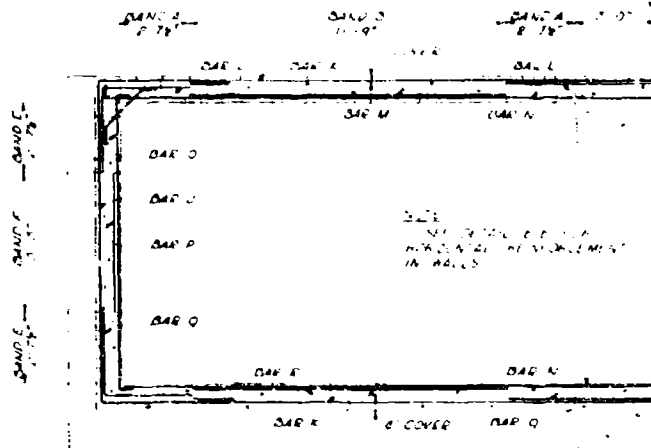
DATE		TIME		LOCATION		BY	
REPORTING OFFICE				SUBJECT			
AMMANN & WHITNEY GENERAL PURPOSE STRUCTURE 111 8TH AVENUE NEW YORK, N Y				DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D C			
DESIGN OF		BY		<b>PROTECTIVE CONSTRUCTION GENERAL PURPOSE STRUCTURE EARTH COVERED, RECTANGULAR 80 PSI BLAST RESISTANT</b>			
CHECKED BY		DATE					
APPROVED BY		DATE					
REVISIONS		DATE					
REVISIONS		DATE					
DRAWN BY				DATE			
CHECKED BY				DATE			
APPROVED BY				DATE			
REVISIONS				DATE			
REVISIONS				DATE			
DATE				TIME			
DATE				TIME			





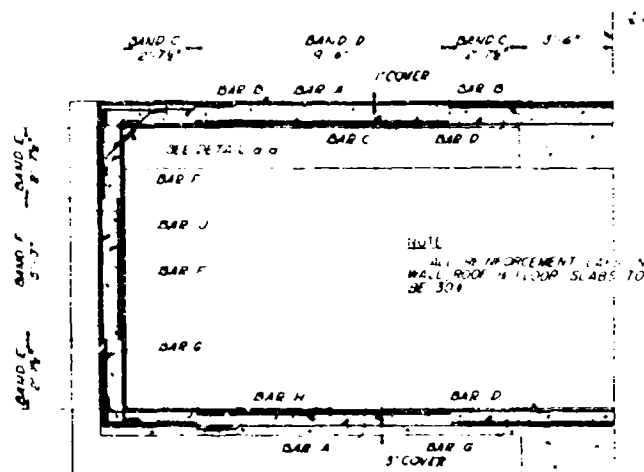
TYPICAL BEAM & PILASTER DETAIL

SCALE: 1/4" = 1'-0"



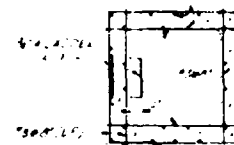
TYPICAL TRANSVERSE SECTION

SCALE: 1/4" = 1'-0"



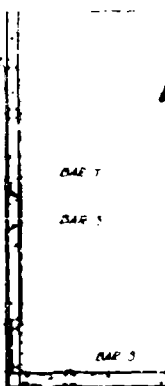
TYPICAL LONGITUDINAL SECTION

SCALE: 1/4" = 1'-0"



SECTION E-E

SCALE: 1/4" = 1'-0"



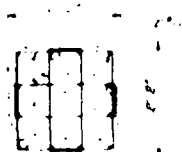
DETAIL

SCALE

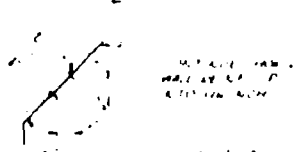
ROOF, FLOOR & WALL SLAB SCHEDULE																							
PANEL	BAND	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	MAX. % STIRRUPS	
ROOF	A	●	●	●	●																		
	B	●	●	●	●																		
	C	●	●	●	●																		
	D											●	●	●	●	●	●	●	●	●	●	100%	
FLOOR	A	●	●	●																			
	B	●	●	●																			
	C	●	●	●																			
	D											●	●	●	●	●				●	●	100%	
FRONT WALL	A																						
	B																						
	C																						
	D																						
SIDE WALL	A																						
	B																						
	C																						
	D																						

BEAM & PILASTER SCHEDULE													
MARK		SIZE		BAR									
NO		W	D	A	B	C	D	E	F	G	H	J	K
1	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"
2	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"
3	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"
4	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"
5	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"
6	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"
7	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"
8	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"
9	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"
10	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"

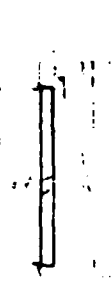
NOTE:  
ALL REINFORCEMENT SHALL BE PLACED IN THE MIDDLE OF THE SLAB UNLESS OTHERWISE SPECIFIED.



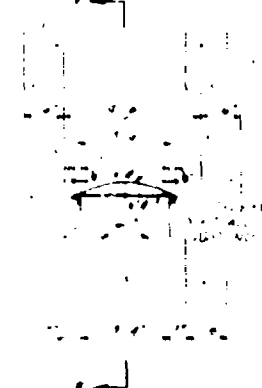
DETAIL OF COLUMN  
SCALE 1/4" = 1'-0"



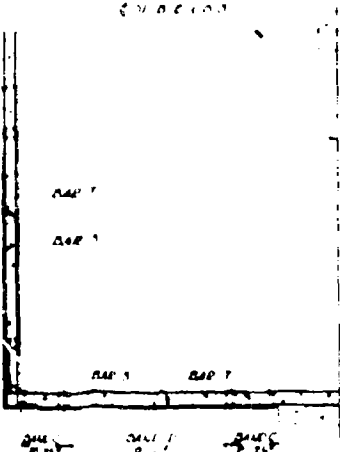
DETAIL R-9  
SCALE 1/4" = 1'-0"



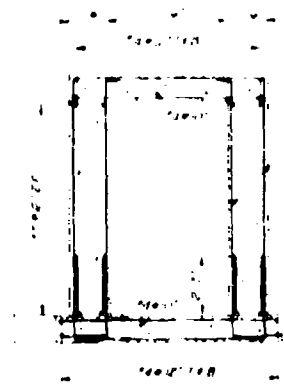
SECTION F-F  
SCALE 1/4" = 1'-0"



DETAIL OF STEEL BLAST  
DOOR AND FRAME  
SCALE 1/4" = 1'-0"



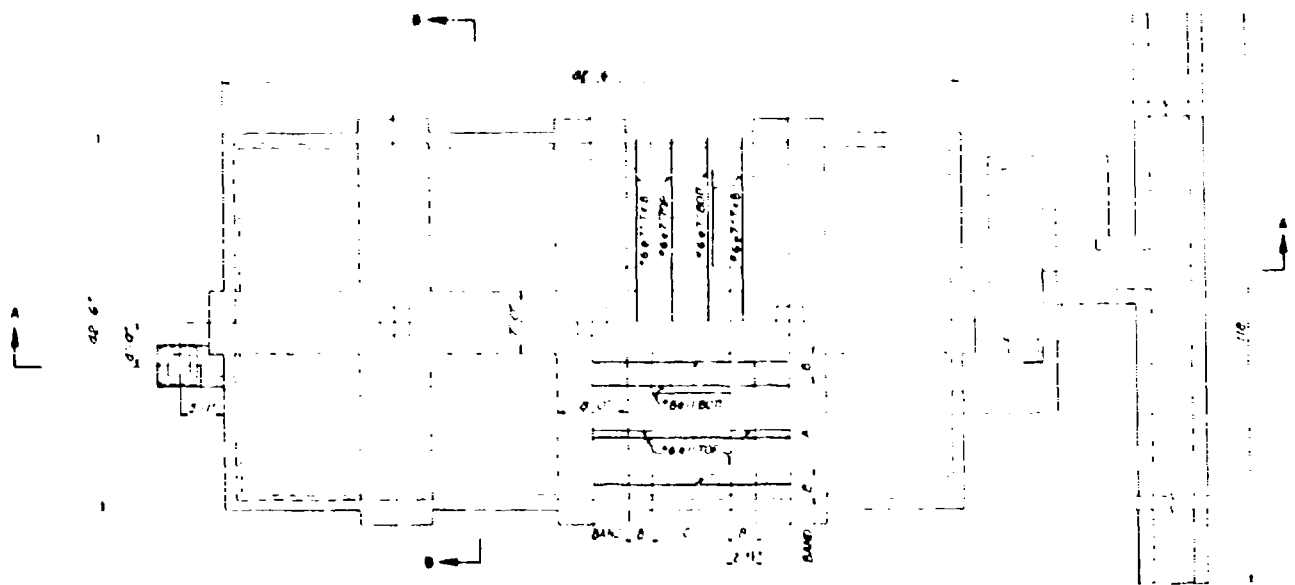
DETAIL D-D  
SCALE 1/4" = 1'-0"



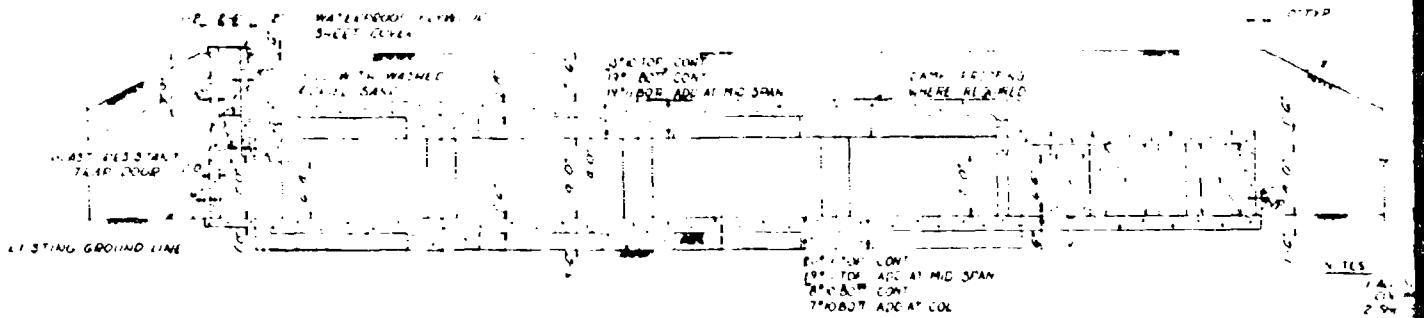
SECTION D-D  
SCALE 1/4" = 1'-0"

2

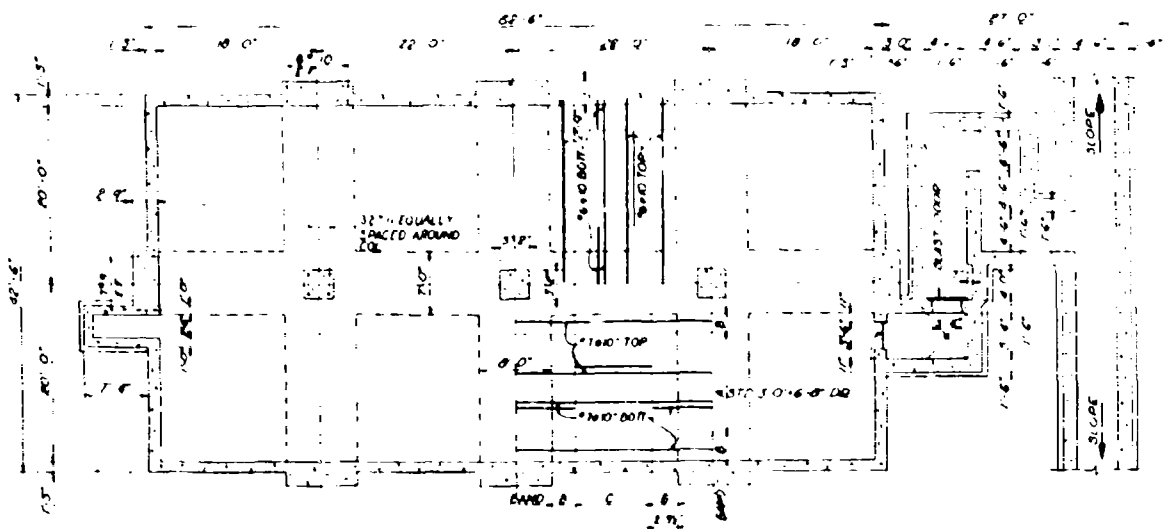
AMMANN & WHITNEY CORPORATION 111 6TH AVENUE, NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.	
PROJECT NO. 100		PROJECT NAME PROTECTIVE CONSTRUCTION GENERAL PURPOSE STRUCTURE EARTH COVERED, RECTANGULAR 50 PSI BLAST RESISTANT	
DESIGNED BY CHECKED BY APPROVED BY		DATE BY FOR	
SHEET NO. 2		SHEET 2 OF 2	



ROOF PLAN

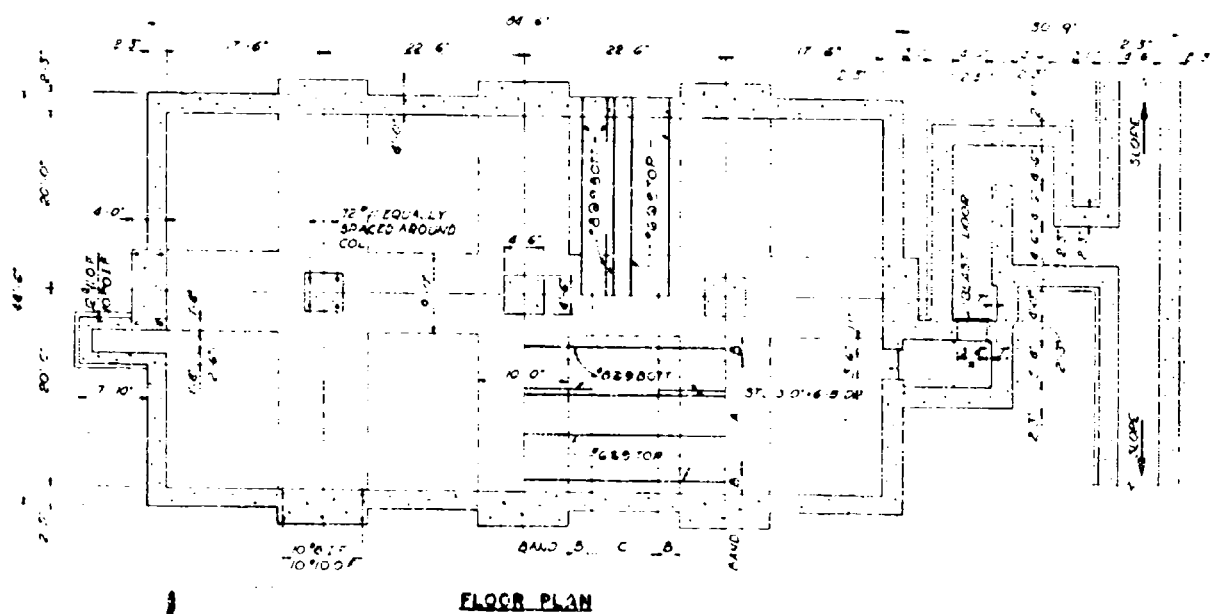
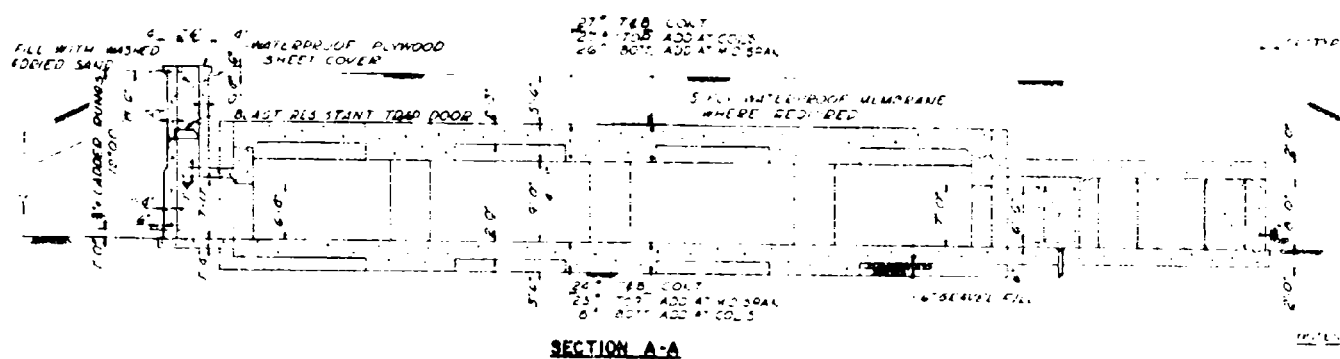
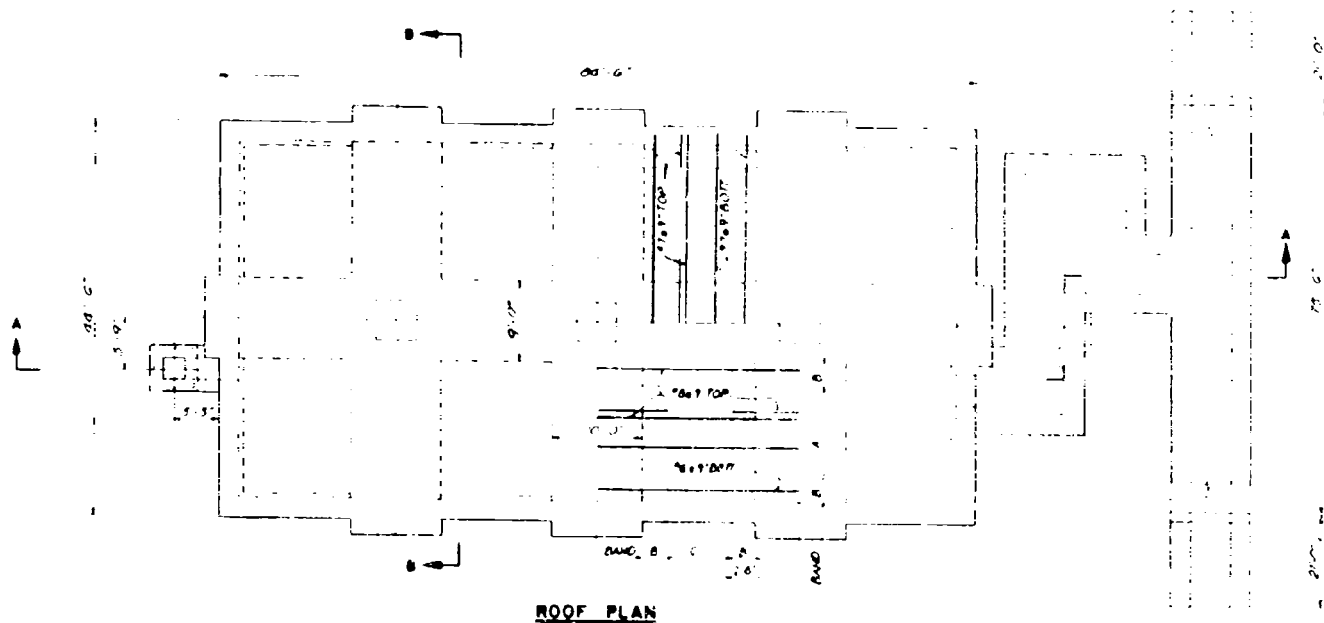


SECTION A-A



FLOOR PLAN

## 44



# DESIGN CONDITIONS

## Design Procedure

The structure shall be designed to resist the effects of the following loads and conditions:

## Design Blast Wave

The structure shall be designed to resist the effects of the following blast wave parameters:

## Blast Loading on Roof

The structure shall be designed to resist the effects of the following blast loading on the roof:

## Blast Loading on Walls

The structure shall be designed to resist the effects of the following blast loading on the walls:

## Nuclear Radiation Protection for Shelter Area

The structure shall be designed to provide nuclear radiation protection for the shelter area as follows:

## Strength of Materials

The structure shall be designed to resist the effects of the following materials:

- Concrete: 4000 psi
- Steel: 36,000 psi
- Reinforcing Steel: 60,000 psi
- Foundation: 10,000 psi
- Foundation: 10,000 psi
- Foundation: 10,000 psi

## Statics

The structure shall be designed to resist the effects of the following static loads:

- Dead Load: 10 psf
- Live Load: 10 psf
- Wind Load: 10 psf
- Seismic Load: 10 psf

## Blast Design

The structure shall be designed to resist the effects of the following blast design loads:

- Blast Load: 10 psf
- Blast Load: 10 psf
- Blast Load: 10 psf

## Allowable Stresses and Deflections

The structure shall be designed to resist the effects of the following allowable stresses and deflections:

- Allowable Stress: 10,000 psi
- Allowable Deflection: 10,000 psi

## General Notes

The following general notes apply to the design of the structure:

- The structure shall be designed to resist the effects of the following general notes:
- The structure shall be designed to resist the effects of the following general notes:
- The structure shall be designed to resist the effects of the following general notes:

NOTES

1. THE STRUCTURE SHALL BE DESIGNED TO RESIST THE EFFECTS OF THE FOLLOWING GENERAL NOTES:

2. THE STRUCTURE SHALL BE DESIGNED TO RESIST THE EFFECTS OF THE FOLLOWING GENERAL NOTES:

3. THE STRUCTURE SHALL BE DESIGNED TO RESIST THE EFFECTS OF THE FOLLOWING GENERAL NOTES:

4. THE STRUCTURE SHALL BE DESIGNED TO RESIST THE EFFECTS OF THE FOLLOWING GENERAL NOTES:

5. THE STRUCTURE SHALL BE DESIGNED TO RESIST THE EFFECTS OF THE FOLLOWING GENERAL NOTES:

6. THE STRUCTURE SHALL BE DESIGNED TO RESIST THE EFFECTS OF THE FOLLOWING GENERAL NOTES:

7. THE STRUCTURE SHALL BE DESIGNED TO RESIST THE EFFECTS OF THE FOLLOWING GENERAL NOTES:

8. THE STRUCTURE SHALL BE DESIGNED TO RESIST THE EFFECTS OF THE FOLLOWING GENERAL NOTES:

9. THE STRUCTURE SHALL BE DESIGNED TO RESIST THE EFFECTS OF THE FOLLOWING GENERAL NOTES:

10. THE STRUCTURE SHALL BE DESIGNED TO RESIST THE EFFECTS OF THE FOLLOWING GENERAL NOTES:

11. THE STRUCTURE SHALL BE DESIGNED TO RESIST THE EFFECTS OF THE FOLLOWING GENERAL NOTES:

12. THE STRUCTURE SHALL BE DESIGNED TO RESIST THE EFFECTS OF THE FOLLOWING GENERAL NOTES:

13. THE STRUCTURE SHALL BE DESIGNED TO RESIST THE EFFECTS OF THE FOLLOWING GENERAL NOTES:

14. THE STRUCTURE SHALL BE DESIGNED TO RESIST THE EFFECTS OF THE FOLLOWING GENERAL NOTES:

15. THE STRUCTURE SHALL BE DESIGNED TO RESIST THE EFFECTS OF THE FOLLOWING GENERAL NOTES:

16. THE STRUCTURE SHALL BE DESIGNED TO RESIST THE EFFECTS OF THE FOLLOWING GENERAL NOTES:

<b>AMMANN &amp; WHITNEY</b> CONSULTING ENGINEERS 111 8TH AVENUE, NEW YORK, N. Y.		<b>DEPARTMENT OF THE ARMY</b> OFFICE OF THE CHIEF OF ENGINEERING ARMY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.	
DRAWN BY: J. H. A. J. CHECKED BY: N. J. APPROVED BY: J. H. A. J. DATE: 10-18-61		<b>PROTECTIVE CONSTRUCTION</b> <b>GENERAL PURPOSE STRUCTURE</b> <b>EARTH COVERED, RECTANGULAR</b> <b>200 PSF BLAST RESISTANT</b>	
SHEET NO. 1 OF 1 TOTAL SHEETS: 1		DATE: 10-18-61 BY: J. H. A. J. CHECKED BY: N. J. APPROVED BY: J. H. A. J.	

2



# DESIGN CONDITIONS

## Design Procedure

In accordance with OCE manual, "Design of Structures for Protection from the Effects of Atomic Weapons"

## Design Blast Wave

Peak incident pressure = 50 psi Duration = 0.03 sec

## Blast Loading on Arch Surface

For pressure 40 psi

## Nuclear Radiation Protection

Total gamma and neutron attenuation to 50r for a direct weapon at any position which will produce a peak blast pressure equal to 50 psi

## Strength of Materials

	Static	Blast Design
Soil bearing capacity	8,000psi	16,000psi
Concrete $f_c$	5,000psi	6,500psi
Rein. Steel, lower yield	47,500psi	52,000psi
(Hot Grade, ASTM A305 50T)		
Structural steel, lower yield	36,000psi	41,600psi
(ASTM A7-50)		
Factor capacity of soil		

## Allowable Stresses and Deflections

The foundation, end walls and entrance way designed for plastic deformation under design blast load Arch designed for a maximum longitudinal deflection equal to  $H/50$  where  $H$  is as indicated in Section B-B. Blast door and escape hatch door designed for maximum elastic deformation under design blast load

## General Notes

1 The following features are not shown and shall be determined to suit use requirements

interior partitions

Mechanical and electrical equipment

air locks and decontamination facilities

2 Access ramp may be provided if required for vehicles

3 Structure may be lowered to ground level and filled as desired

4 For entrance way and escape hatch reinforcement and blast door details see Earth Covered Rectangular Structure, Design No. 60-18-02

## SECTION B-B

SCALE:  $\frac{1}{4}'' = 1'-0''$

## SECTION C-C

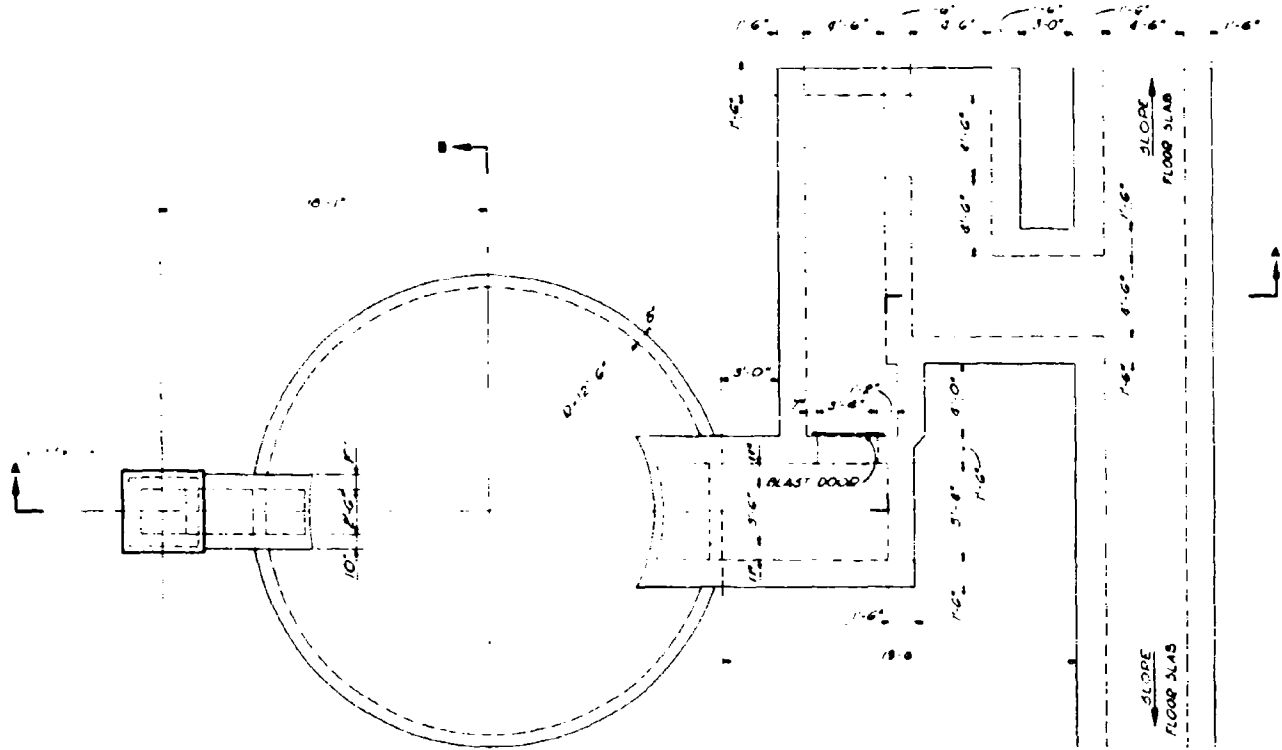
SCALE:  $\frac{1}{4}'' = 1'-0''$

## SECTION D-D

SCALE:  $\frac{1}{4}'' = 1'-0''$

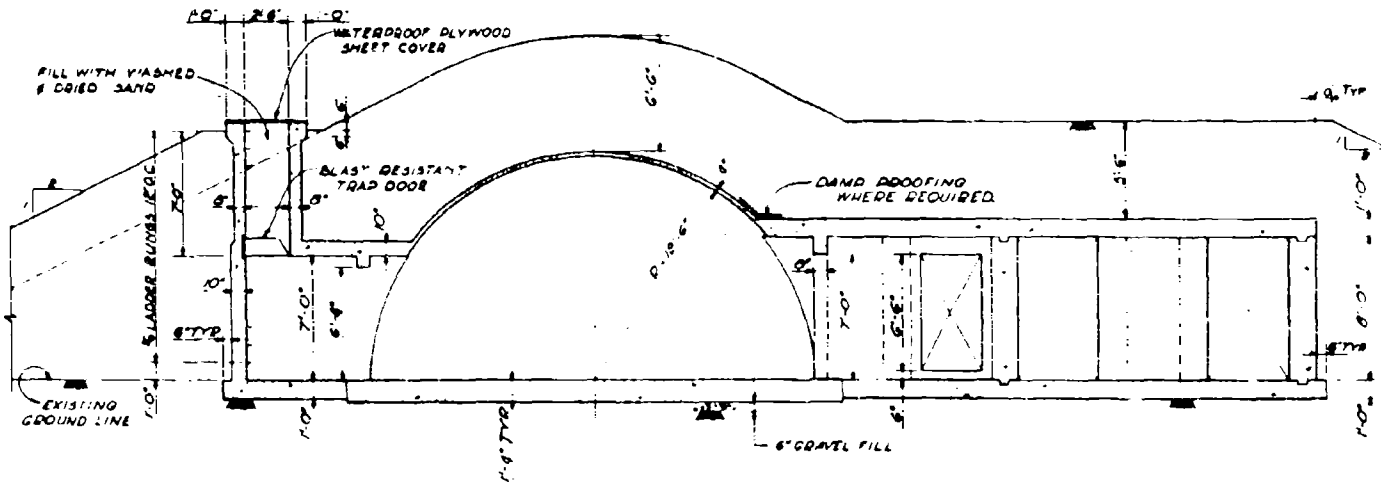
REVISION		DATE	DESCRIPTION	BY	APPROVAL
AMMANN & WHITNEY CONSULTING ENGINEERS 111 5TH AVENUE, NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.			
DESIGNED BY F. J. W.		PROJECT PROTECTIVE CONSTRUCTION GENERAL PURPOSE STRUCTURE EARTH COVERED DOUBLE BARREL ARCH 50 PSI BLAST RESISTANT			
CHECKED BY V. D.		DRAWING NUMBER 60-18-02			
DATE SEP 1960		SHEET 1 OF 1			





ROOF PLAN

NOTE



SECTION A-A

## DESIGN CONDITIONS

### Design Procedure

In accordance with OCE manual, "Design of Structures for Protection from the Effects of Atomic Weapons"

### Design Blast Wave

Peak incident pressure = 50 psi Duration = 0.85 sec

### Blast Loading on Dome Surface

Static pressure = 15 psi

### Nuclear Radiation Protection

Take gamma and neutrons attenuated to 50% for a HART weapon at any distance which will produce a peak blast pressure equal to 50 psi.

### Strength of Materials

	Static	Blast Design
Soil bearing capacity	8,000 psf	16,000 psf
Concrete		
Dome	3,500 psi	3,900 psi
Remainder of Structure	3,000 psi	3,500 psi
Reinforcing steel	47,500 psi	50,000 psi
Structural steel, lower yield (ASTM A7-50)	36,000 psi	41,600 psi
*Rated capacity of soil		

### Allowable Stresses and Deflections

The foundation and entrance way designed for plastic deformation under design blast load. Dome, blast door and escape hatch door designed for maximum elastic deformation under design blast load.

### General Notes

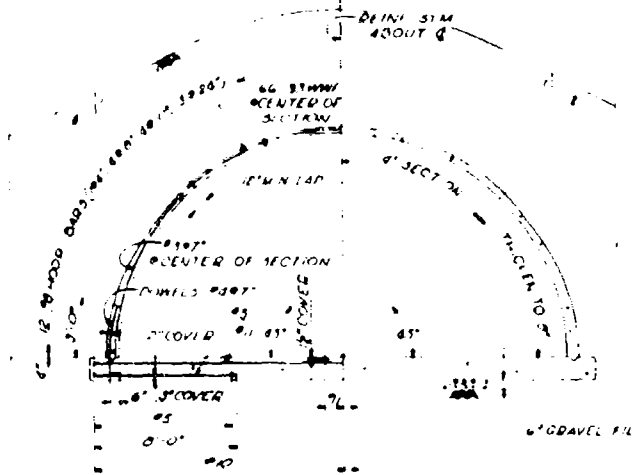
1. The following features are not shown and shall be determined by local use requirements:

- Interior partitions
- Mechanical and electrical equipment
- Air locks and accommodation facilities

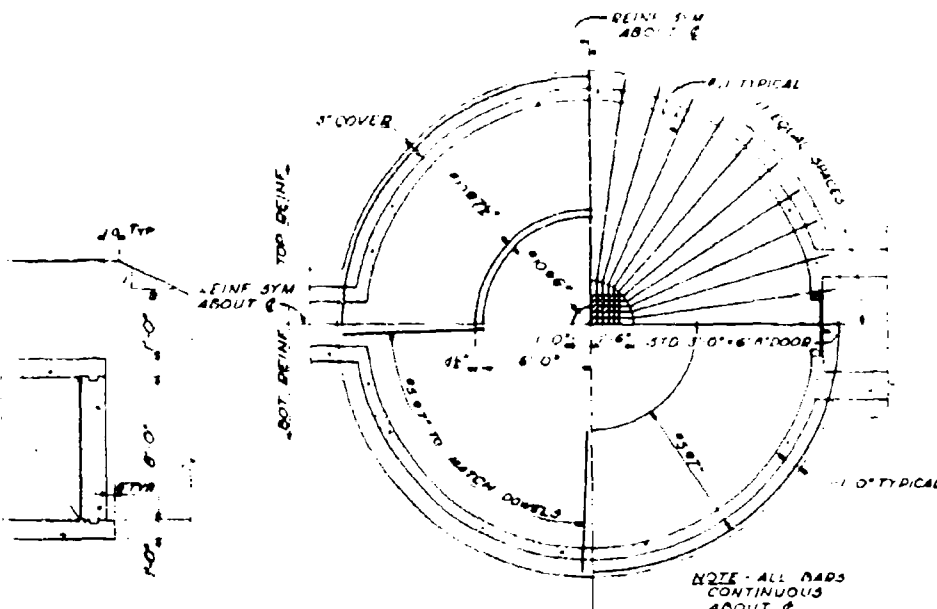
2. Access ramp may be provided, if required for vehicles.

3. Structure may be lowered to ground level and filled if desired.

4. For entrance way and escape hatch reinforcement, and blast door details see Part I, Chapter Rectangular Slips. Structure Eng. No. 60-18-D.

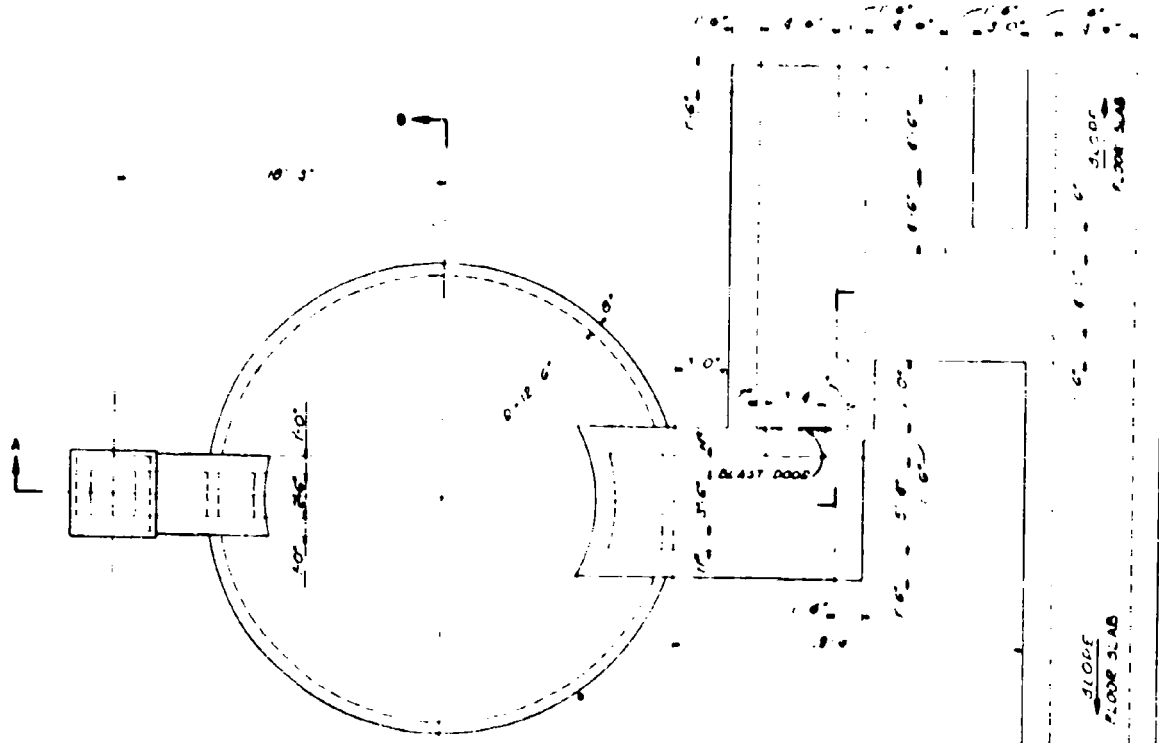


SECTION B-B

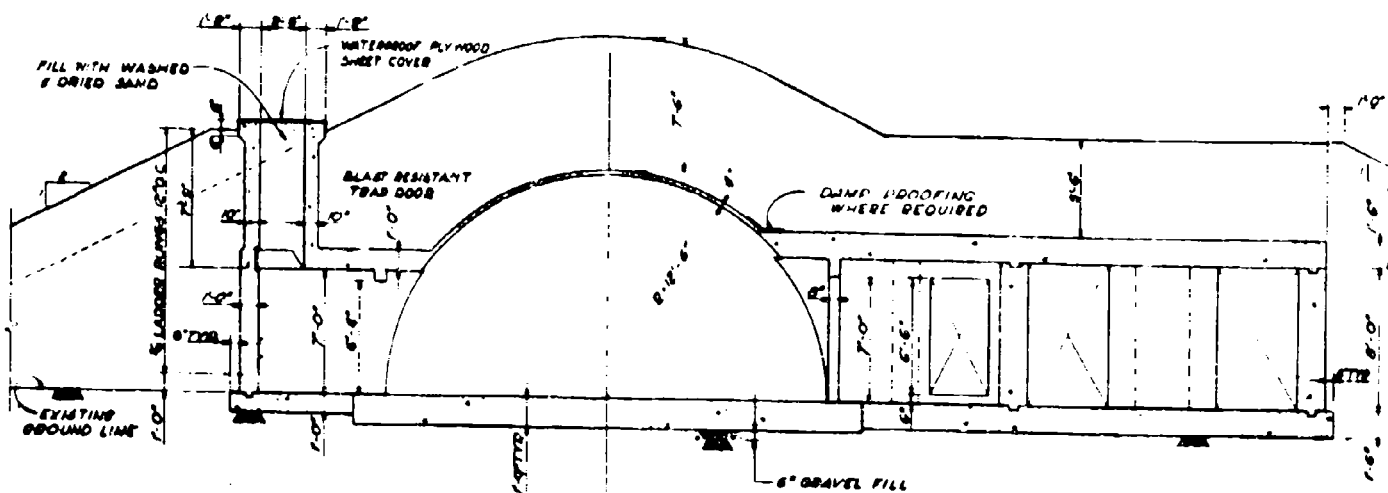


FLOOR SLAB AND FOUNDATION PLAN

REVISION		DATE	DESCRIPTION	BY	APPROVED
AMMANN & WHITNEY		DEPARTMENT OF THE ARMY		OFFICE OF THE CHIEF OF ENGINEERS	
111-8TH AVENUE, NEW YORK, N. Y.		MILITARY CONSTRUCTION ENGINEERING DIVISION		WASHINGTON, D. C.	
PROJECT NO.		F. W.		PROTECTIVE CONSTRUCTION	
DESIGNED BY		EL		GENERAL PURPOSE STRUCTURE	
CHECKED BY		[Signature]		EARTH COVERED DOME	
APPROVED BY		[Signature]		60 PSI BLAST RESISTANT	
DATE		1/8-5-57		DRAWING NUMBER	
60-18-D2		SHEET		OF	



**ROOF PLAN**



**SECTION A-A**

# DESIGN CONDITIONS

## Design Procedure

In accordance with OCE manual, "Design of Structures for Protection from the Effects of Atomic Weapons"

## Design Blast Wave

Peak incident pressure = 100psi Duration = 0.64 sec

## Blast Loading on Dome Surface

Peak pressure = 155psi

## Nuclear Radiation Protection

Total gamma and neutron attenuation to 50r for a 200RT weapon at any position which will produce a peak blast pressure equal to 100psi

## Strength of Materials

	Static	Blast Design
So bearing capacity	8,000psi	16,000psi
Concrete $f_c$		
Dome	4,000psi	5,200psi
Remainder of Structure	5,000psi	6,500psi
Reinf. Steel, lower yield	47,500psi	57,000psi
First Grade ASTM A305-30T		
Structural steel, lower yield	38,000psi	46,000psi
(ASTM A7-50)		

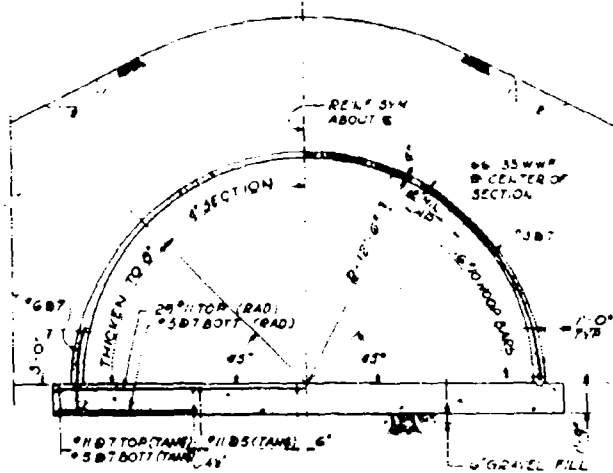
\* rated capacity of soil

## Allowable Stresses and Deflections

The foundation and entrance way designed for plastic deformation under design blast load. Dome, blast door and shape hatch door designed for maximum elastic deformation under design blast load

## General Notes

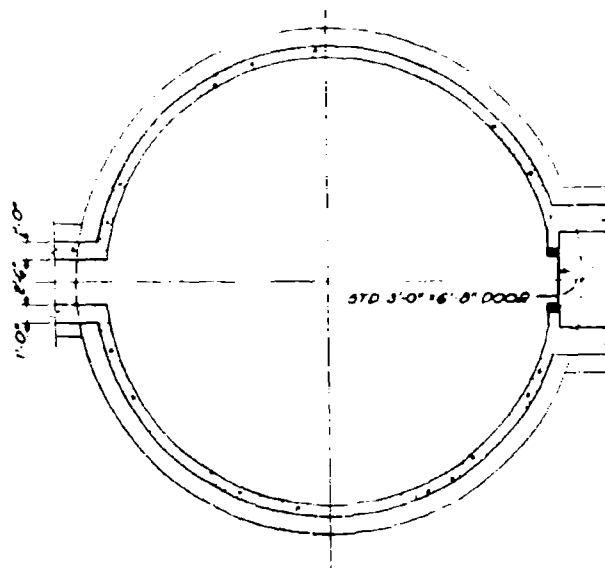
- The following features are not shown and shall be determined to suit use requirements:  
Interior partitions  
Mechanical and electrical equipment  
Air locks and decontamination facilities
- Access ramp may be provided if required for vehicles.
- Thermal protection to be applied to all exterior doors
- Structure may be lowered to balance cut and fill if desired



NOTE

SHEAR REINFORCING NOT SHOWN

SECTION 8-8



FLOOR SLAB AND FOUNDATION PLAN

AMMANN & WHITNEY CONSULTING ENGINEERS 111-5th AVENUE, NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS BULFORD CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.	
PROJECT NO. P. J. W.		PROJECT NO. P. J. W.	
DESIGNED BY P. J. W.		DESIGNED BY P. J. W.	
CHECKED BY P. J. W.		CHECKED BY P. J. W.	
APPROVED BY P. J. W.		APPROVED BY P. J. W.	
DATE 1/24/50		DATE 1/24/50	
PROJECT TITLE		PROJECT TITLE	
PROTECTIVE CONSTRUCTION		PROTECTIVE CONSTRUCTION	
GENERAL PURPOSE STRUCTURE		GENERAL PURPOSE STRUCTURE	
EARTH COVERED DOME		EARTH COVERED DOME	
100 PSI BLAST RESISTANT		100 PSI BLAST RESISTANT	
SCALE 1/4" = 1'-0"		SCALE 1/4" = 1'-0"	
SHEET NO. 60-18-08		SHEET NO. 60-18-08	

2



**Design Procedure**  
in accordance with ACI manual "Design of Structures for Protection from the Effects of Atomic Weapons."

Peak incident = 2.5 x 10<sup>6</sup> / (4000 x 1000) = 0.625 x 10<sup>-3</sup> = 0.000625

1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 26

fast neutrons and neutrons are added to the system to maintain the chain reaction.

Strength of Materials	Static Analysis*	Blot Design
Soil Bearing Capacity	100,000 psi	
Concrete	5,000 psi	6,000 psi
Reinforcing Steel, low yield	40,000 psi	50,000 psi
Reinforcing Steel, high yield		
Structural Steel, low yield	36,000 psi	46,000 psi
Structural Steel, high yield		
* Rated capacity of soil		

The foundation and entrance was designed for plastic deformation under design blast load. Dome, blast door and escape hatch door designed for maximum elastic deformation under design blast load.

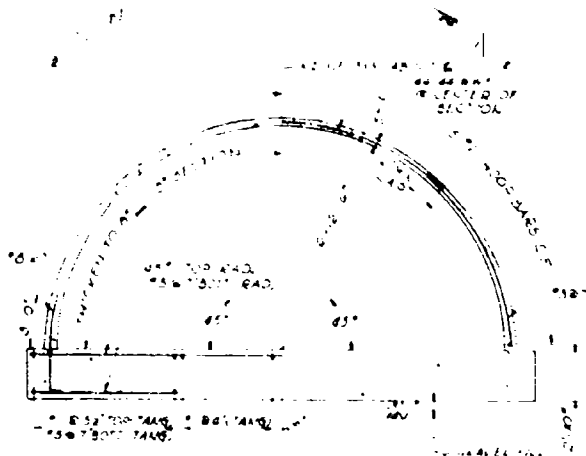
The following features are not shown and shall be determined to suit use requirements:

- interior partitions
- mechanical and electrical equipment
- air lines and decontamination facilities

2. Access ramp may be provided if required for vehicles

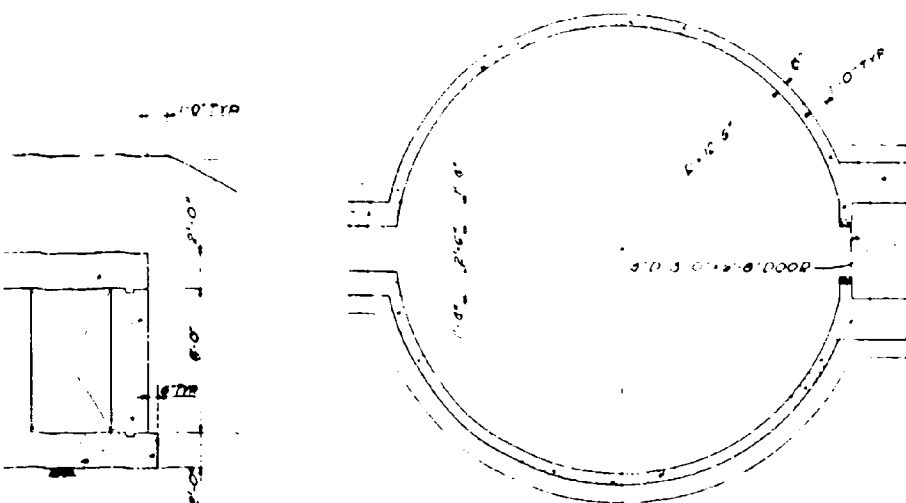
3. Thermal protection to be applied to all exterior doors

4. Structure may be lowered to balance but not fill if desired



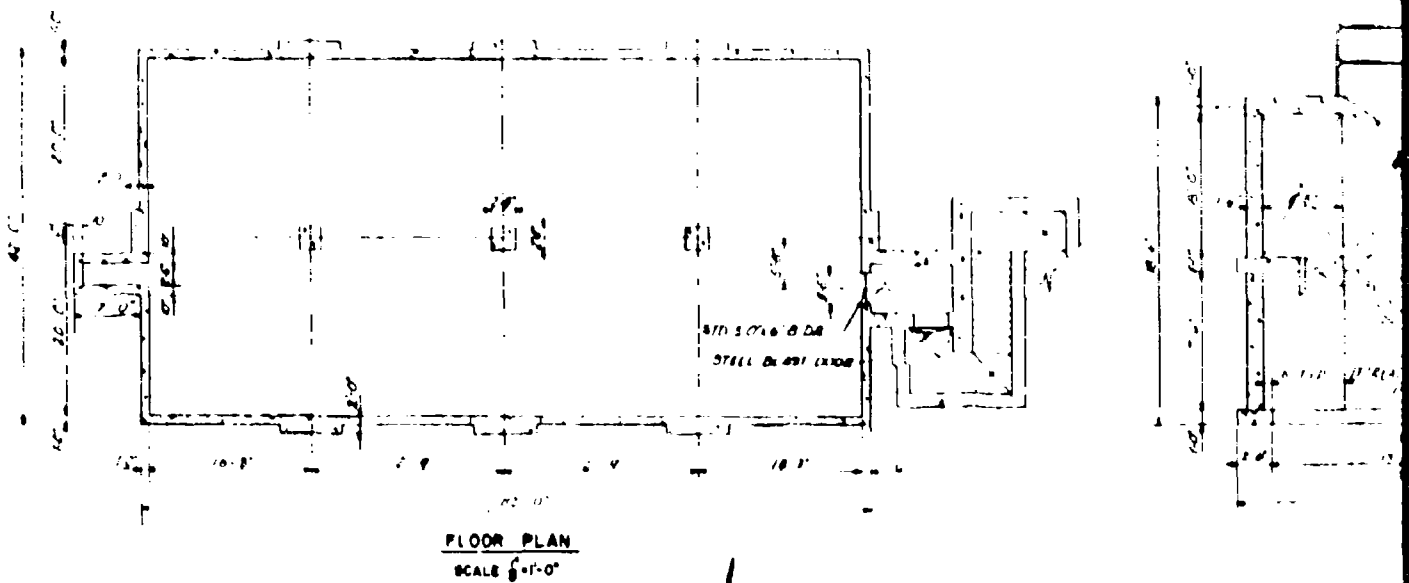
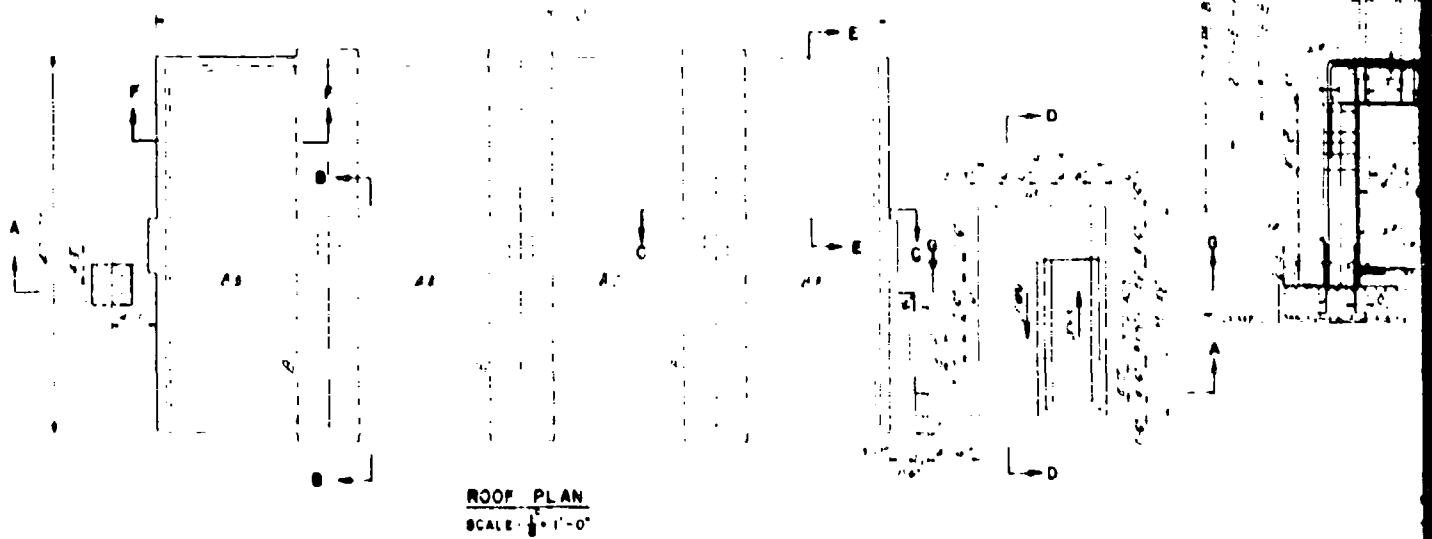
NO 76 SHEAR RELEASE, STIRN, PC NOT SHOWN

**SECTION B-B**



FLOOR SLAB AND FOUNDATION PLAN

AMMANN & WHITNEY CORPORATION 111-8TH AVENUE, NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.	
PROJECT NO.	F. J. W.	<b>PROTECTIVE CONSTRUCTION GENERAL PURPOSE STRUCTURE EARTH COVERED DOME 300 PSI BLAST RESISTANT</b>	
TITLE OF PROJECT			
DATE			
BY			
FOR THE USE OF		PROJECT NO.	15A-4-9
DATE		DRAWING NUMBER	60-16-03
BY		REVISION	



### Design Procedure

In accordance with U.S. Army, "The Effects of Atomic Weapons"

### Design Blast Wave

Peak incident pressure = 60 psi

### Factor Loading on Exterior Surface

Incident pressure = 60 psi; Duration

### Design Explosion Protection

Total ground and structure resistance of soil within shock will produce

### Strength of Materials

Soil bearing capacity

Concrete

Reinforcing Steel, lower yield

Hot Rolled Steel, lower yield

Structural Steel, lower yield

ASTM A7-60

Factor capacity of soil

### Attenuate Pressure and Deformation

Roof and walls designed for plastic

Design factor, no open spaces, etc., design

under design blast load

### General Notes

1. The following features are to

be required:

Interior panels

Reinforced masonry

for doors and windows

2. Access stairs may be varied as

3. Access ramp may be provided if

is required for truck

is 0.00 sec

For a 100 ft square

blast pressure equal

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### SECTION B-B

SCALE 1/4"=1'-0"

### SECTION C-C

SCALE 1/4"=1'-0"

### SECTION D-D

N.T.S.

### SECTION V-V

SCALE 1/4"=1'-0"

### SECTION H-H

SCALE 1/4"=1'-0"

### DETAIL

### STEEL BLAST DOOR

### AND FRAME

SCALE 1/4"=1'-0"

AMMANN & WHITNEY

111 5TH AVENUE, NEW YORK, N. Y.

DESIGNED BY J.S. 17

CHECKED BY J.S. 17

APPROVED BY J.S. 17

DATE FOR ISSUE 12/1/50

DATE FOR ISSUE 12/1/50

DATE FOR ISSUE 12/1/50

DATE FOR ISSUE 12/1/50

DATE FOR ISSUE 12/1/50

DATE FOR ISSUE 12/1/50

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DATE FOR ISSUE 12/1/50

DATE FOR ISSUE 12/1/50

DATE FOR ISSUE 12/1/50

DEPARTMENT OF THE ARMY

OFFICE OF THE CHIEF OF ENGINEERS

WASHINGTON, D. C.

CONSTRUCTION

PROPOSED STRUCTURE

RECTANGULAR

Blast Resistant

AS NOTED

AS NOTED

AS NOTED

AS NOTED

AS NOTED

AS NOTED

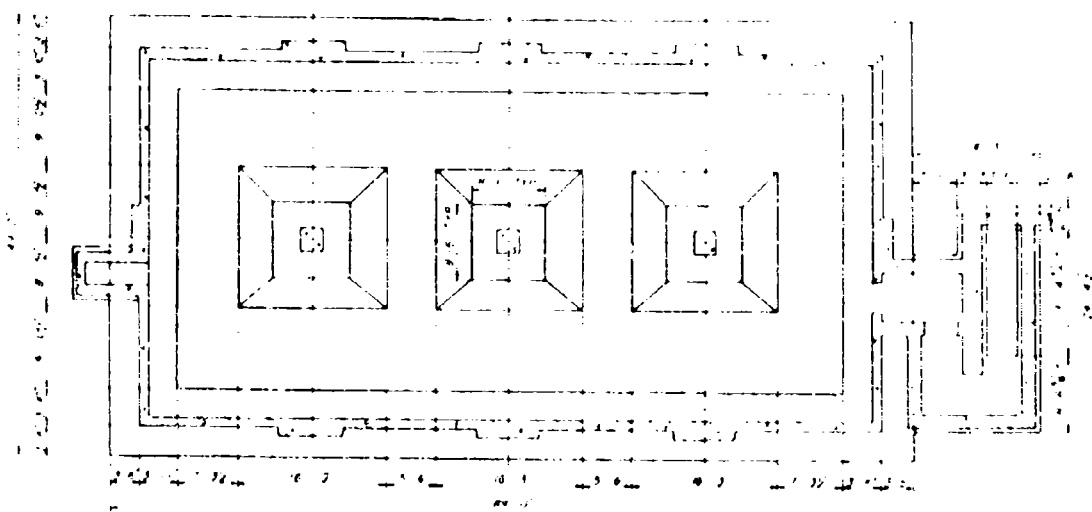
AS NOTED

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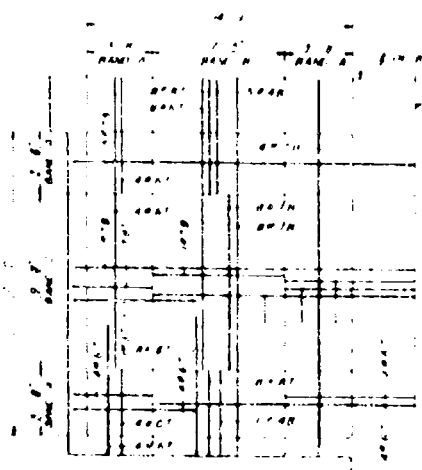
2



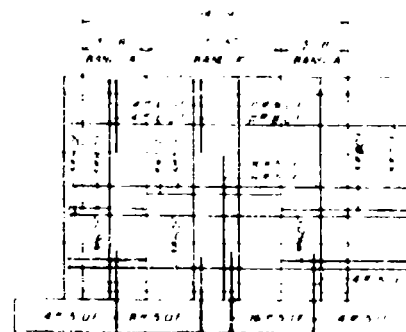


FOUNDATION PLAN  
SCALE 1/4" = 1'-0"

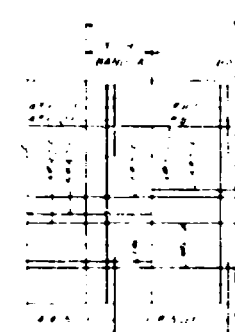
OF  
50



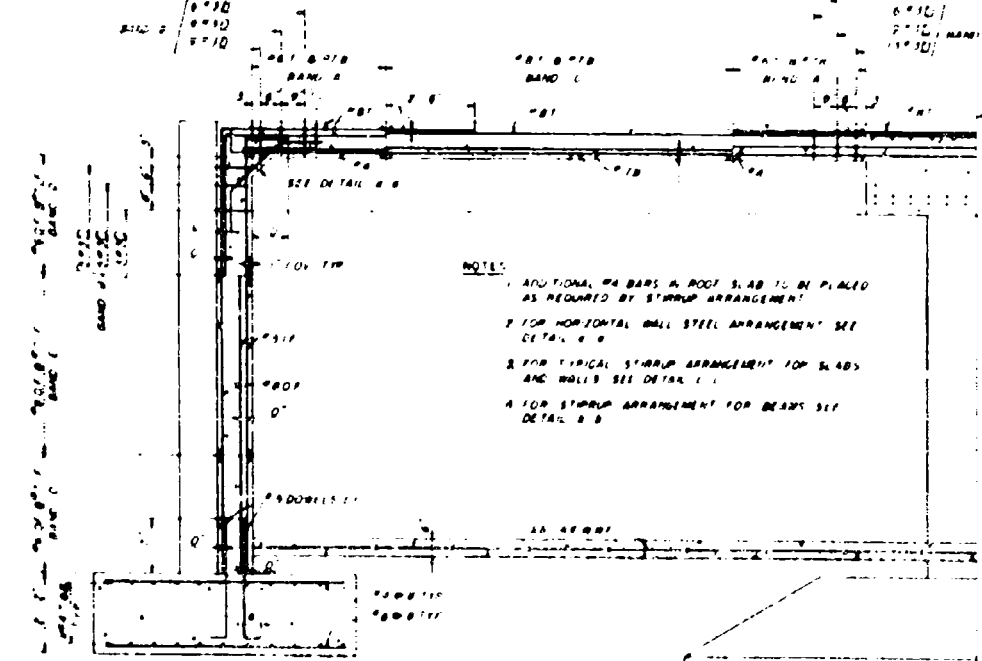
TYPICAL ROOF SLAB  
SCALE 1/4" = 1'-0"



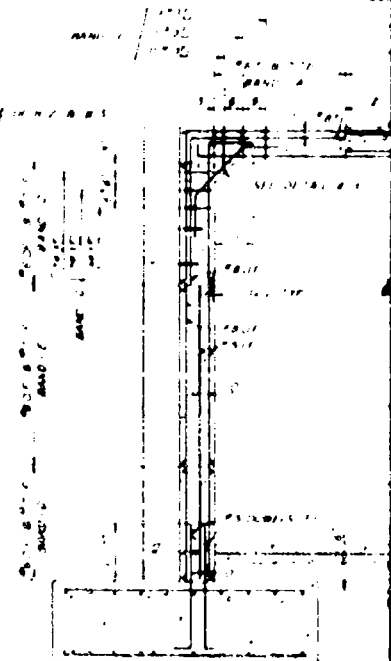
TYPICAL FRONT & REAR WALL  
SCALE 1/4" = 1'-0"



TYPICAL  
SCALE 1/4" = 1'-0"

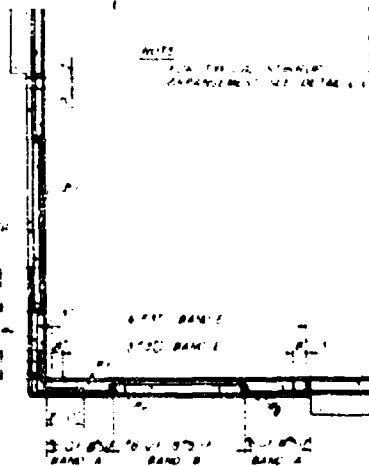


SECTION E-E  
SCALE 1/4" = 1'-0"



50

- NOTES:
1. ADDITIONAL #4 BARS IN ROOF SLAB TO BE PLACED AS REQUIRED BY STIRRUP ARRANGEMENT
  2. FOR HORIZONTAL BELL STEEL ARRANGEMENT SEE DETAIL A-B
  3. FOR TYPICAL STIRRUP ARRANGEMENT FOR SLABS AND WALLS SEE DETAIL C-D
  4. FOR STIRRUP ARRANGEMENT FOR BEAMS SEE DETAIL E-F



DETAIL 0-0  
SCALE  $\frac{1}{4}$ "=1'-0"



TYPE A



TYPE B



TYPE C



TYPE E



TYPE D

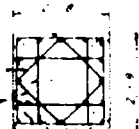


TYPE F

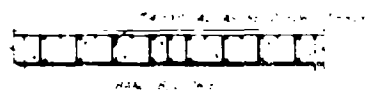
DETAIL B-B  
SCALE  $\frac{1}{4}$ "=1'-0"



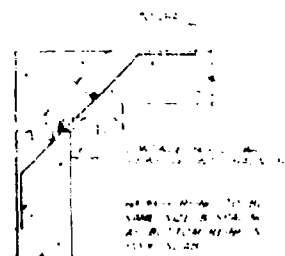
DETAIL OF COLUMN FOOTING  
SCALE  $\frac{1}{4}$ "=1'-0"



DETAIL OF COLUMN  
SCALE  $\frac{1}{4}$ "=1'-0"

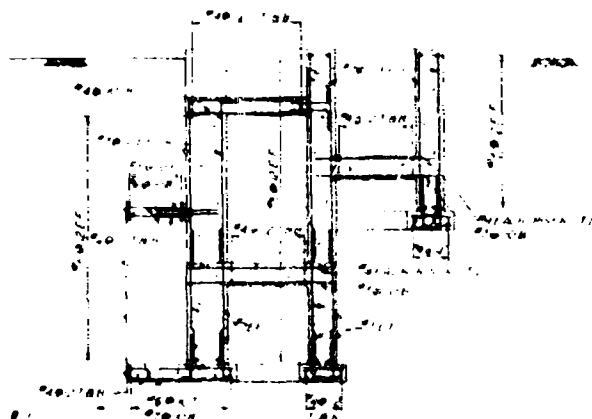


DETAIL C-C  
SCALE  $\frac{1}{4}$ "=1'-0"



DETAIL D-D  
SCALE  $\frac{1}{4}$ "=1'-0"

TYPICAL END WALL  
SCALE  $\frac{1}{4}$ "=1'-0"



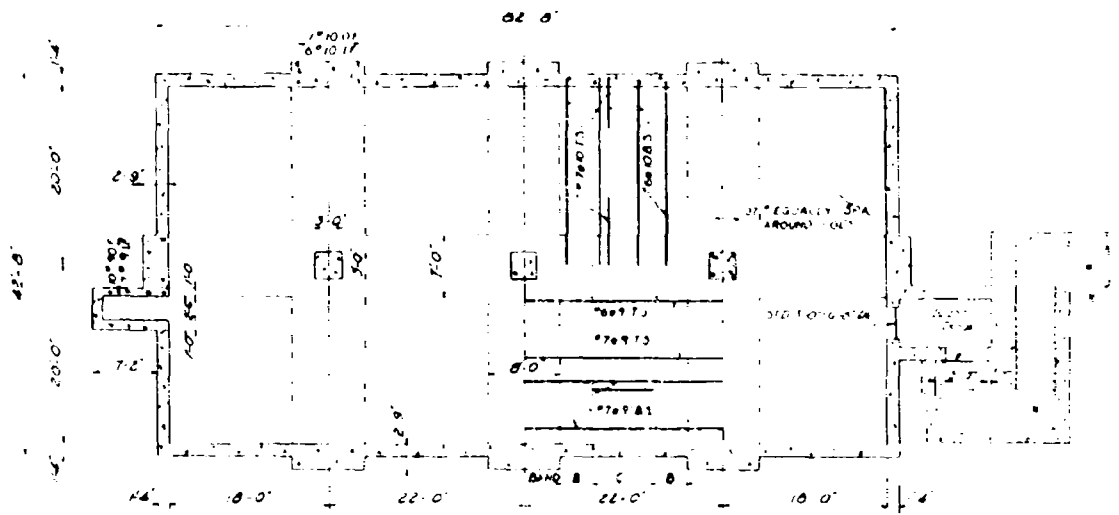
SECTION 0-0  
SCALE  $\frac{1}{4}$ "=1'-0"

- NOTES
1. ADDITIONAL #4 BARS IN ROOF SLAB TO BE PLACED AS REQUIRED BY STARTUP ARRANGEMENT.
  2. FOR TYPICAL STARTUP ARRANGEMENT FOR SLABS AND WALLS SEE DETAIL C-C.
  3. FOR STARTUP ARRANGEMENTS FOR BEAMS SEE DETAIL 0-0.

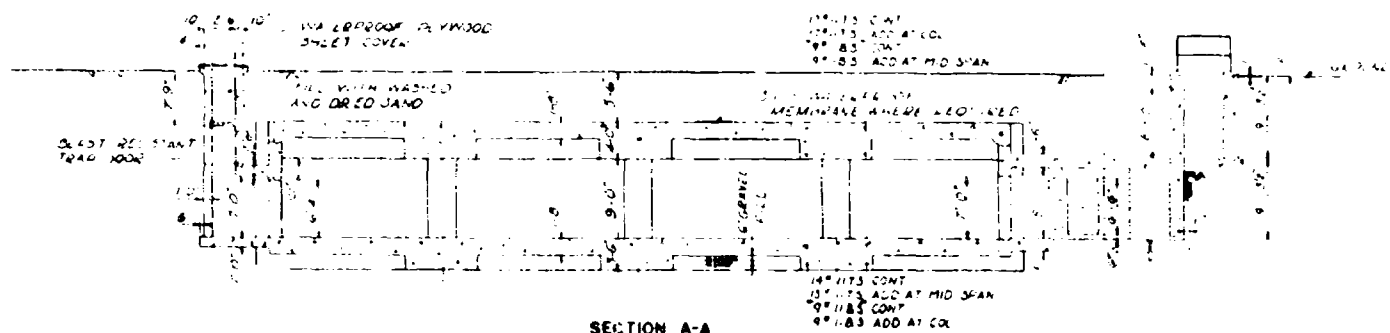
SECTION F-F  
SCALE  $\frac{1}{4}$ "=1'-0"

AMMANN & WHITNEY CONSULTING ENGINEERS 111 8TH AVENUE, NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.	
PROJECT NO. 1-5 DRAWING NO. 1-5 DATE 1-1-54		PROTECTIVE CONSTRUCTION GENERAL PURPOSE STRUCTURE BURIED RECTANGULAR 80 PSI BLAST RESISTANT	
PREPARED BY [Signature] CHECKED BY [Signature] DATE 1-1-54		AS NOTED DATE 1-1-54 DRAWING NUMBER 80-18-04	
DATE 1-1-54		PAGE 2 OF 2	

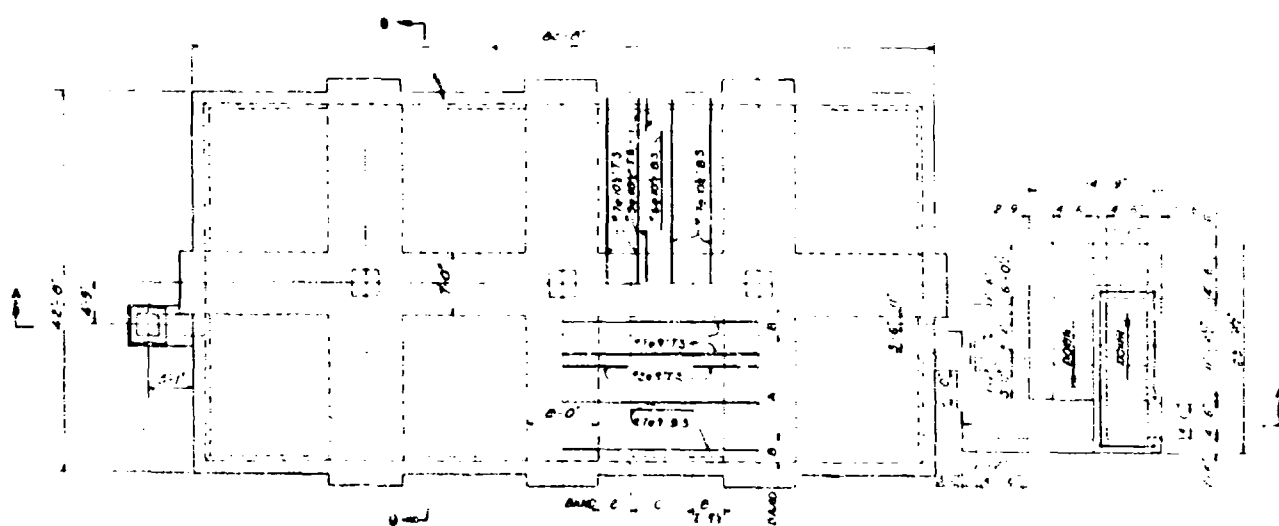
2



**FLOOR PLAN**  
**SCALE 1/8" = 1'-0"**



**SECTION A-A**  
**SCALE = 1" = 1'-0"**



**ROOF PLAN**  
**SCALE 1/8" = 1'-0"**

### DESIGN CONDITIONS

### Design Procedure

**Design Procedure**  
in accordance with OCE manual, Design of Structures for Protection  
from the Effects of Atomic Weapons

Design Point Wave

1 atm incident pressure = 100 psi Duration = 64 sec

### Steel Loading On Exterior Surfaces

From pressure: 100 psi Duration: 10 sec.

## Nuclear Radiation Protection

**Nuclear Radiation Protection**  
Total gamma dose received at 500 ft. is about 1000 mrem or 0.01 rads, a dose which will produce a peak blast pressure equal to 100 lbs/sq. ft.

Strength of Materials	Static	Wind Design
Soil bearing capacity	8,000 psi*	16,000 psi
Concrete, f'c	5,000 psi	6,500 psi
Rein steel, lower yield (first Grade ASTM A305 50T)	47,300 psi	52,000 psi
Structural steel, lower yield (ASTM A 57 50T)	58,000 psi	61,600 psi

\* 2000 年 1 月 1 日 起 实 施

### Allowable Stresses and Deflections

*note: only two types of keys are designed for each defendant  
only design first key first day and escape both days designed for  
maximum daily deflection under design first key*

### General Notes

The following features are not shown and shall be determined to suit use requirements

interior partitions

mechanical and electrical equipment

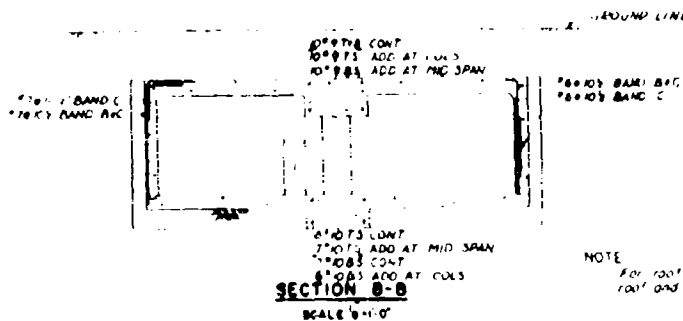
AN locks and decontamination facilities

2 Access points may be varied as required

3 Access ramp may be provided if required for vehicles

3. Access ramp may be provided if required for  
4. Fire protection to be applied to all exterior doors

- WALL REPAIR STN AD? !



NOTE

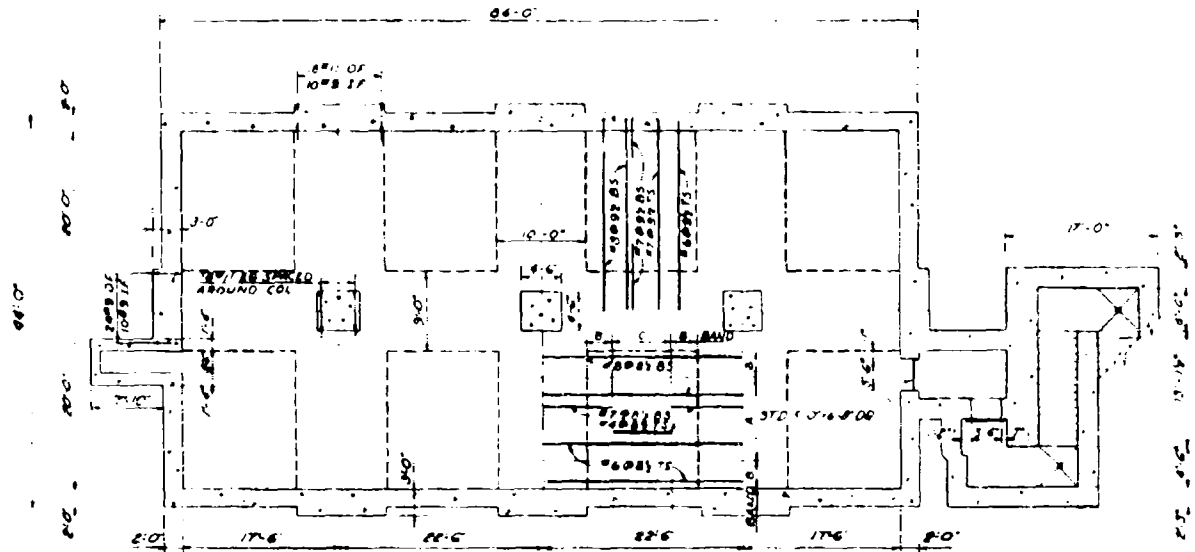
For root and tree, root and  
root and from, etc.

**SECTION 8-0**

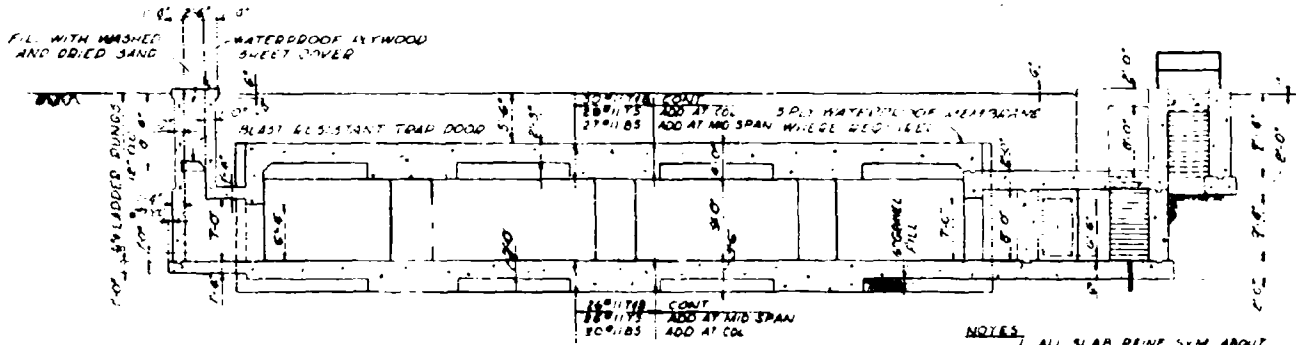
SCALE 1"=1'-0"

7. 1970-1971

AMMANN & WHITNEY REPAIRING DIVISION 111.0TH AVE. ALBANY, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF MATERIALS MILITARY CONSTRUCTION DISTRICT Engineer Washington, D. C.	
DESIGN OF FABRIC BY DRAWN BY CHECKED BY APPROVED BY	PROTECTIVE CONSTRUCTION GENERAL PURPOSE STRUCTURE BURIED RECTANGULAR 100 PSI BLAST RESISTANT		
DATE DRAWING NUMBER 60-10-04	60-10-04		

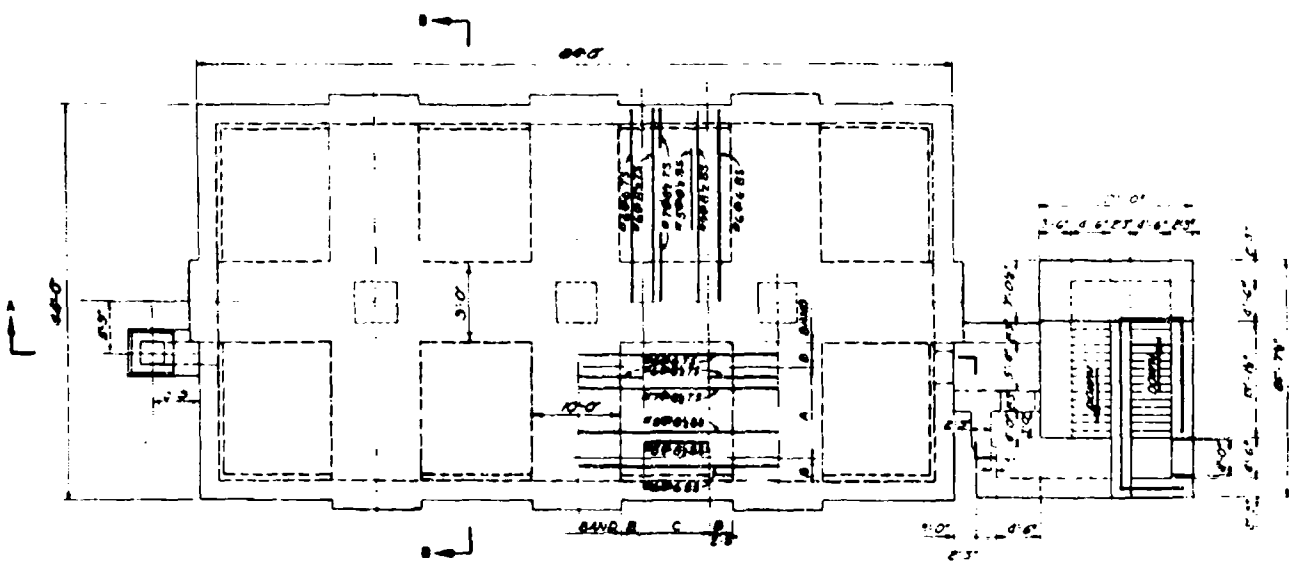


FLOOR PLAN

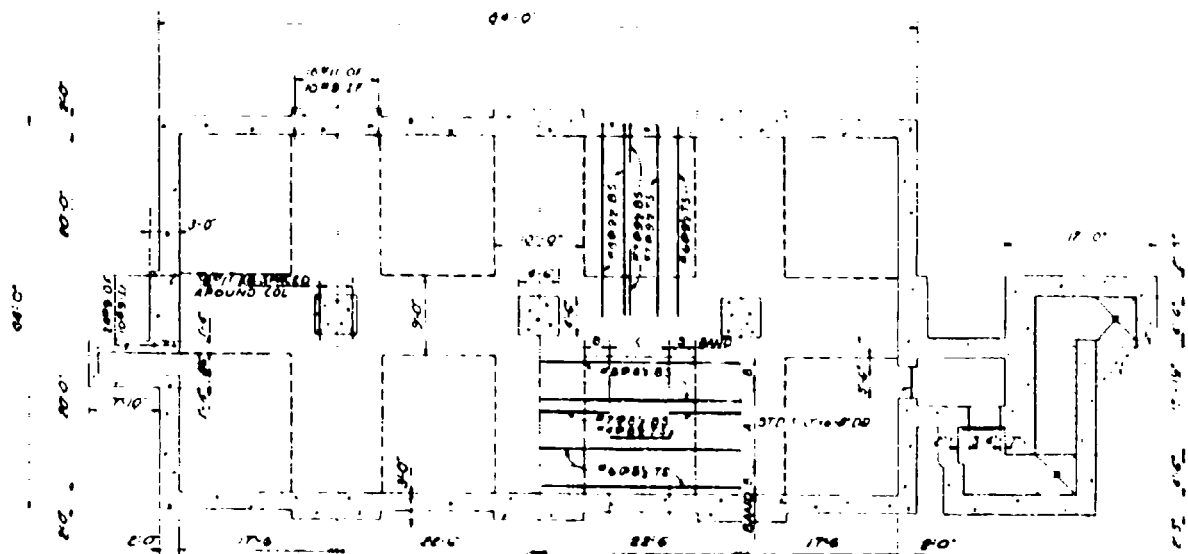


SECTION A-A

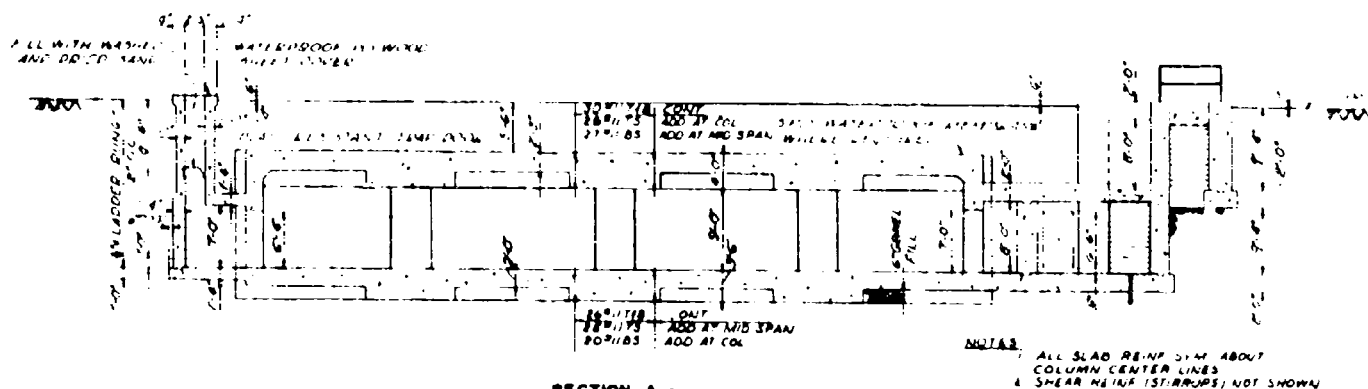
NOTES:  
1. ALL SLAB REINF. SYM. ABOUT COLUMN CENTER LINES  
2. SHEAR REINF. (STIRRUPS) NOT SHOWN



ROOF PLAN

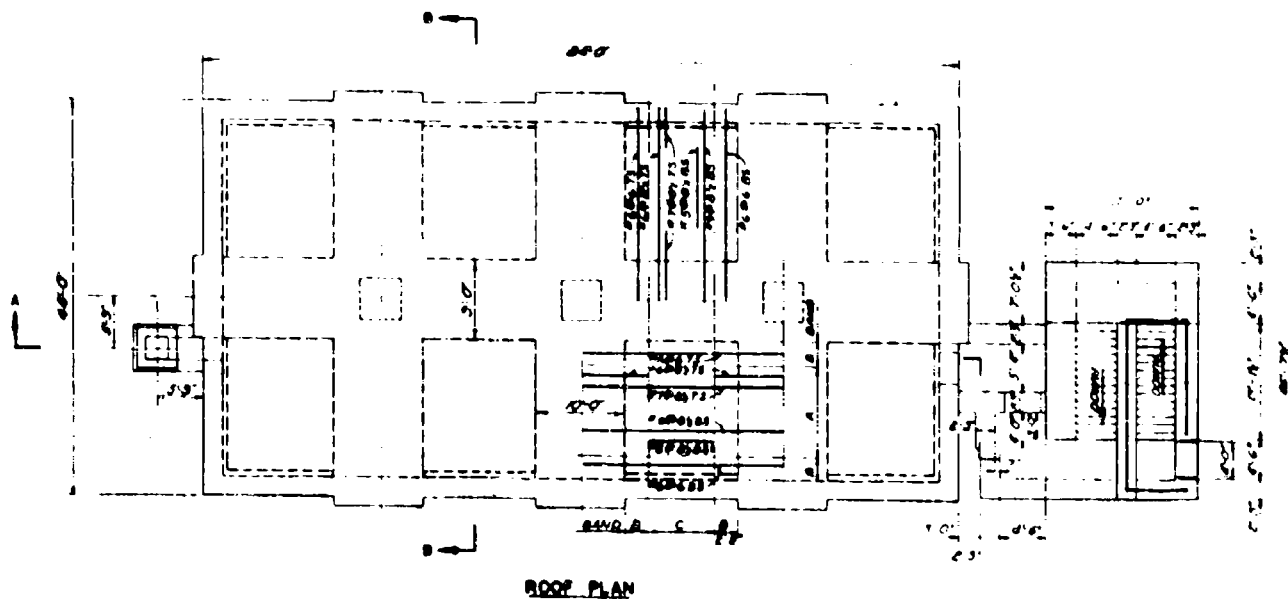


FLOOR PLAN



**SECTION A-A**

NOTES:  
1. ALL SLAB REINFC SYM ABOUT  
COLUMN CENTER LINES  
& SHEAR REINFC (STIRRUPS) NOT SHOWN



ROOF PLAN

## DESIGN CONDITIONS

### Design Procedure

In accordance with ACE manual, "Design of Structures for Protection from the Effects of Atomic Weapons."

### Design Blast Wave

Peak incident pressure = 200 psi Duration = 0.41 sec

### Blast Loading on Exterior Surface

Peak pressure = 200 psi Duration = 0.41 sec

### Nuclear Radiation Protection

Total gamma and neutrons attenuated to 50% for a 5000 ft weapon at any position which will produce a peak blast pressure equal to 200 psi

### Strength of Materials

	Static	Blast Design
Soil bearing capacity	8,000 psf	16,000 psf
Concrete, f	5,000 psi	6,500 psi
Reinforcing steel, yield	47,500 psi	52,000 psi
Structural steel, lower yield (ASTM A305, 307)		
Structural steel, lower yield (ASTM A7-50)	38,000 psi	41,600 psi
Water capacity of soil		

### Allowable Stresses and Deflections

Roof, walls, floor and entrance only designed for plastic deformation under design blast load. Blast door and escape hatch door designed for maximum elastic deformation under design blast load.

### General Notes

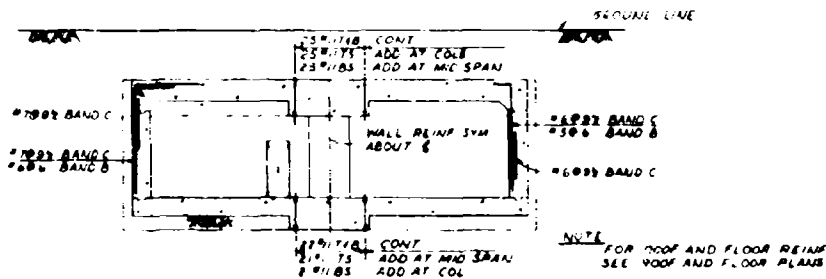
1. The following features are not shown and shall be determined to suit use requirements:

- Interior partitions
- Mechanical and electrical equipment
- Air locks and decontamination facilities

2. Access stairs may be added as required.

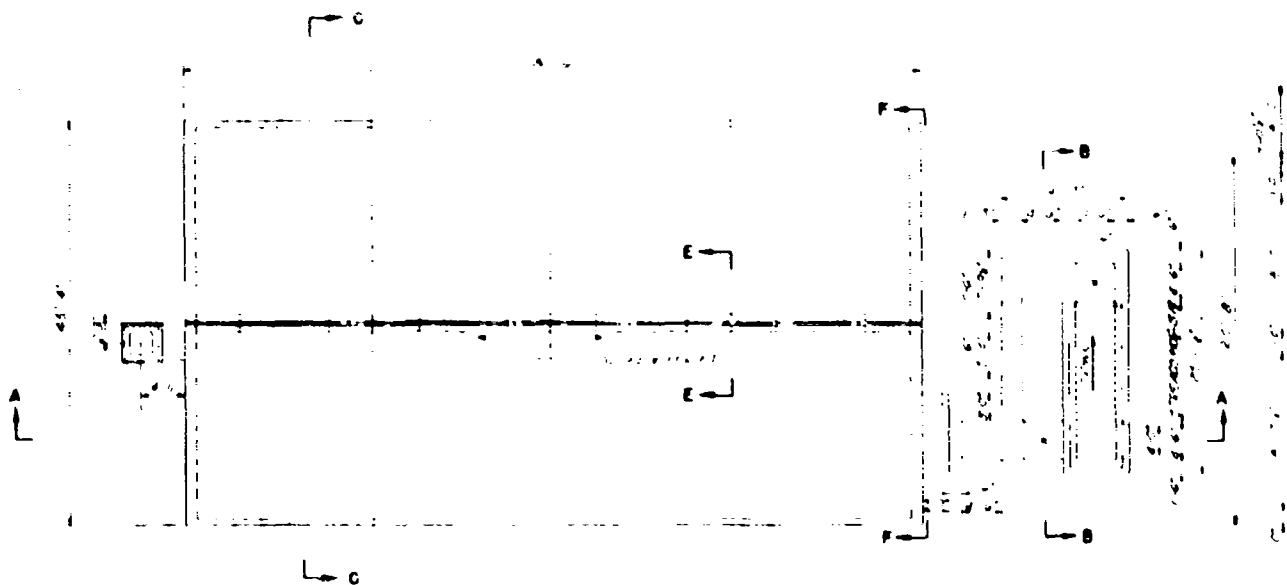
3. Access ramp may be provided as required for vehicles.

4. Thermal protection to be applied to all exterior doors.

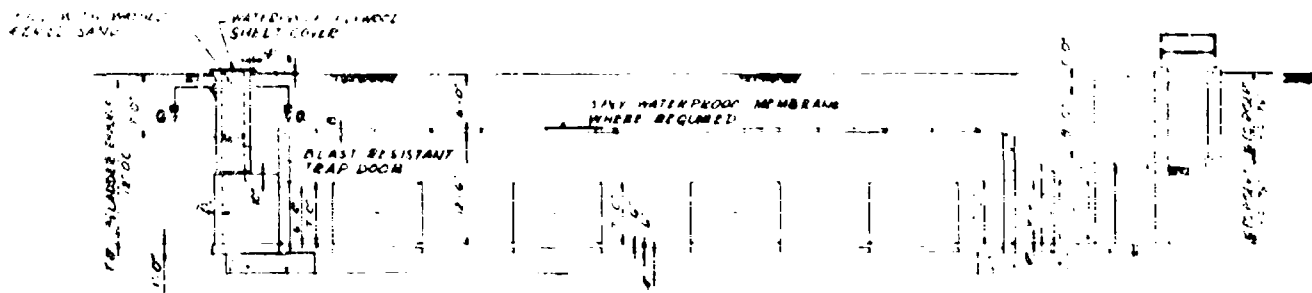


SECTION B-B

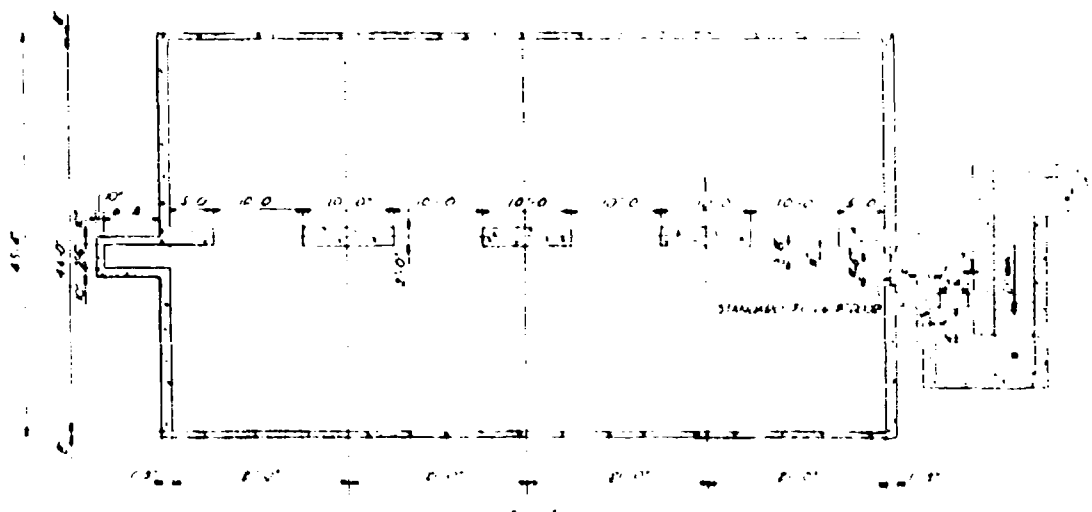
<b>AMMANN &amp; WHITNEY</b> ENGINEERING CORPORATION 111-5TH AVENUE NEW YORK, N. Y.		<b>DEPARTMENT OF THE ARMY</b> OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.	
DRAWN BY B. B. CHECKED BY H. B. APPROVED BY J. B.		<b>PROTECTIVE CONSTRUCTION</b> <b>GENERAL PURPOSE STRUCTURE</b> <b>BURIED RECTANGULAR</b> <b>200 PSI BLAST RESISTANT</b>	
DATE 10-10-54		DRAWING NUMBER 60-10-04	



**ROOF PLAN**  
SCALE 1/4" = 1'-0"



**SECTION A-A**  
SCALE 1/4" = 1'-0"



**FLOOR PLAN**  
SCALE 1/4" = 1'-0"



# DESIGN CONDITIONS

## Design Procedure

In accordance with OCE Manual, "Design of Structures for Protection from the Effects of Atomic Weapons"

## Design Blast Wave

Peak incident pressure in the direction of travel

## Blast Loading On Exterior Surface

Peak pressure: 50 PSI - Duration: 1/100 sec.

## Nuclear Radiation Protection

The structure shall be designed to protect personnel from nuclear radiation at any location within the structure at peak blast pressure above 50 PSI

## Strength of Materials

	Static	Blast Design
Concrete	4,000 PSI	4,000 PSI
Reinforcing Steel	60,000 PSI	60,000 PSI
Steel Decking	40,000 PSI	40,000 PSI
Steel Decking (ASTM A 601)	40,000 PSI	40,000 PSI
Steel Decking (ASTM A 601)	40,000 PSI	40,000 PSI
Steel Decking (ASTM A 601)	40,000 PSI	40,000 PSI
Steel Decking (ASTM A 601)	40,000 PSI	40,000 PSI

## Allowable Stresses and Deflections

The structure shall be designed to resist deflection under design blast load. Arch, blast wall and floor arch shall be designed for maximum static deflection under design blast load.

## General Notes

1. The following features are not shown and shall be determined to suit the requirements:

- Interior partitions
- Mechanical and electrical equipment
- Access and decontamination facilities

2. Access stairs may be varied as required

3. Access ramp may be provided if required for vehicles

4. For alternate way reinforcement and blast wall details see Buried Rectangular Dips Structure, Drawing No. 60-16-04

## SECTION B-B

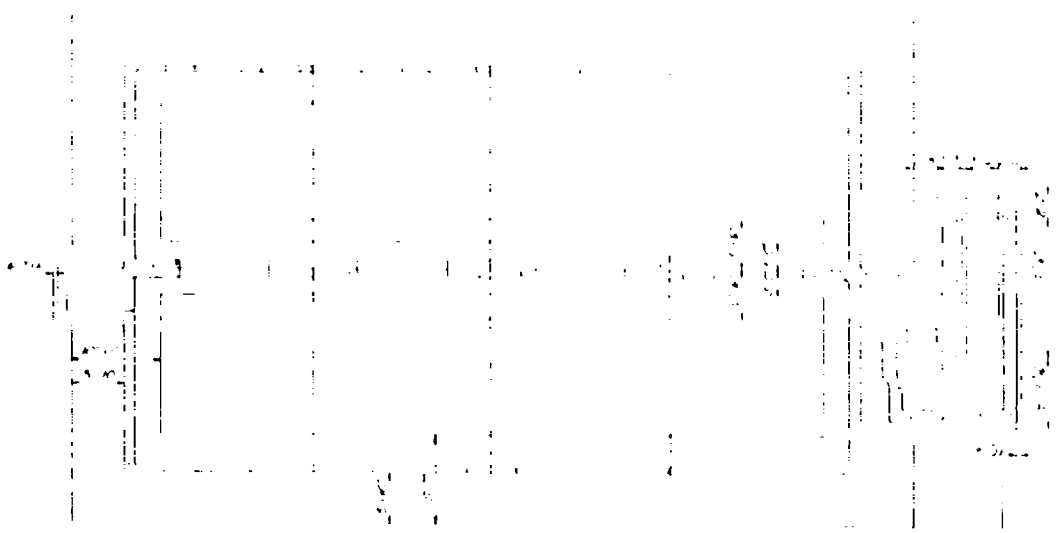
SCALE NTS

## SECTION C-C

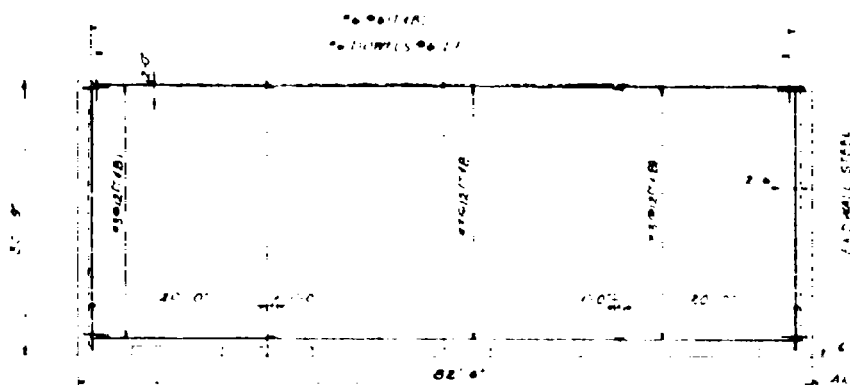
SCALE 1/2" = 1'-0"

<b>ARMANN &amp; WHITNEY</b> ENGINEERS AND ARCHITECTS 111 - 8TH AVENUE, NEW YORK, N. Y.		<b>DEPARTMENT OF THE ARMY</b> CORPS OF THE CHIEF OF ENGINEERS ENGINEERING CENTER, WASHINGTON, D. C.	
DRAWING NO. 60-16-04 SCALE 1/2" = 1'-0"		<b>PROTECTIVE CONSTRUCTION</b> <b>GENERAL PURPOSE STRUCTURE</b> <b>BURIED DOUBLE BARREL ARCH</b> <b>50 PSI BLAST RESISTANT</b>	
DESIGNED BY J.S. CHECKED BY J.S. APPROVED BY J.S.		DATE 10-10-60 DRAWING NUMBER 60-16-04 SHEET 1 OF 2	

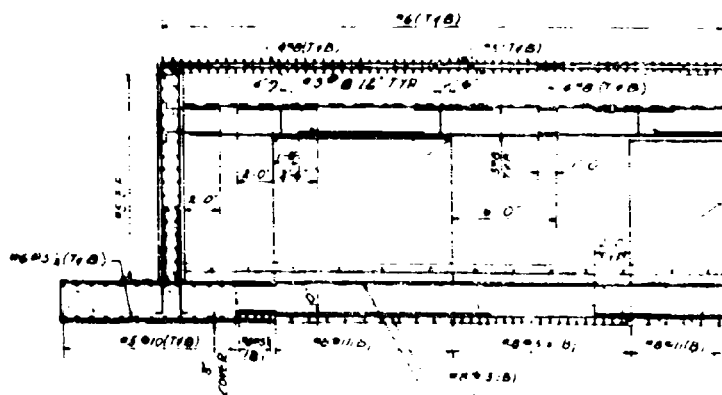
2



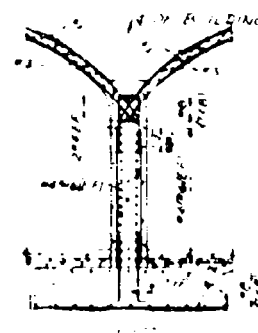
**FOUNDATION PLAN**  
SCALE 1/4" = 1'-0"



**DEVELOPED ROOF PLAN**  
SCALE 1/4" = 1'-0"



**SECTION D-D**  
SCALE 1/4" = 1'-0"

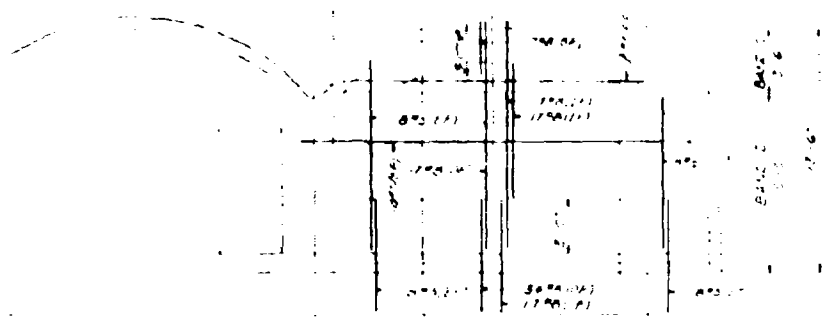


**SECTION E-E**  
SCALE 1/4" = 1'-0"

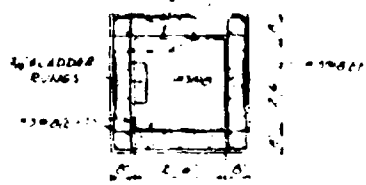
SEE BUILDING

ALL WALLS, STIFF, SIMILAR  
TO THAT OF BUILDING

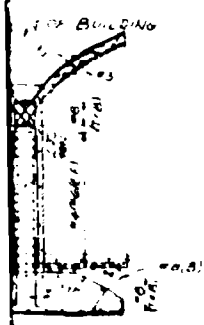
BASE 1 4 5.0' BASE 2 11.0' BASE 3 11.0'



SECTION F-F  
SCALE 1/4"=1'-0"



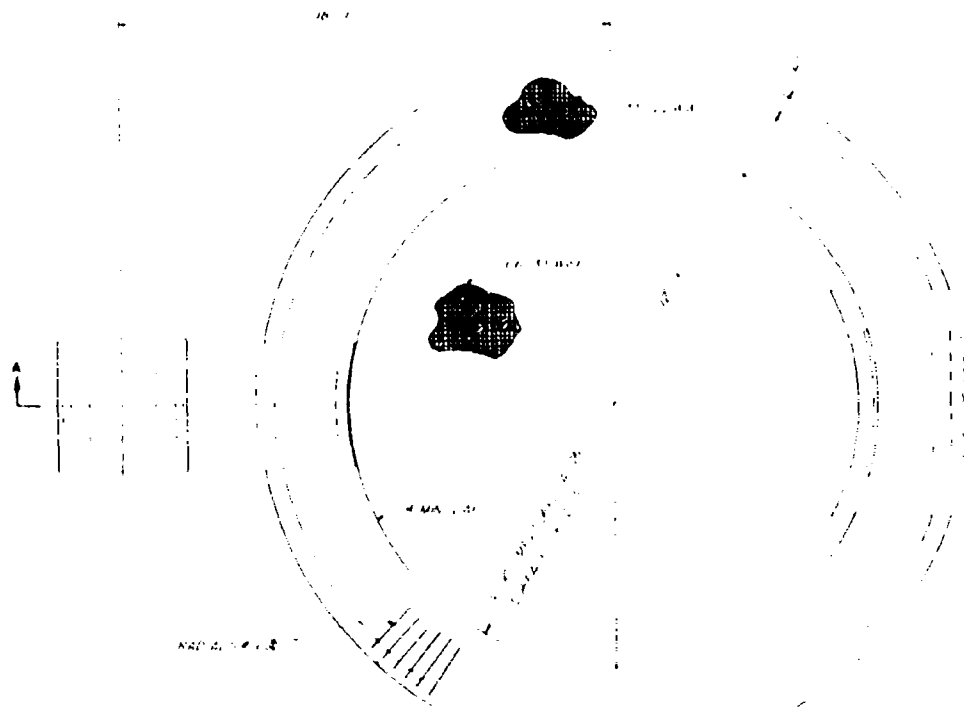
SECTION G-G  
SCALE 1/4"=1'-0"



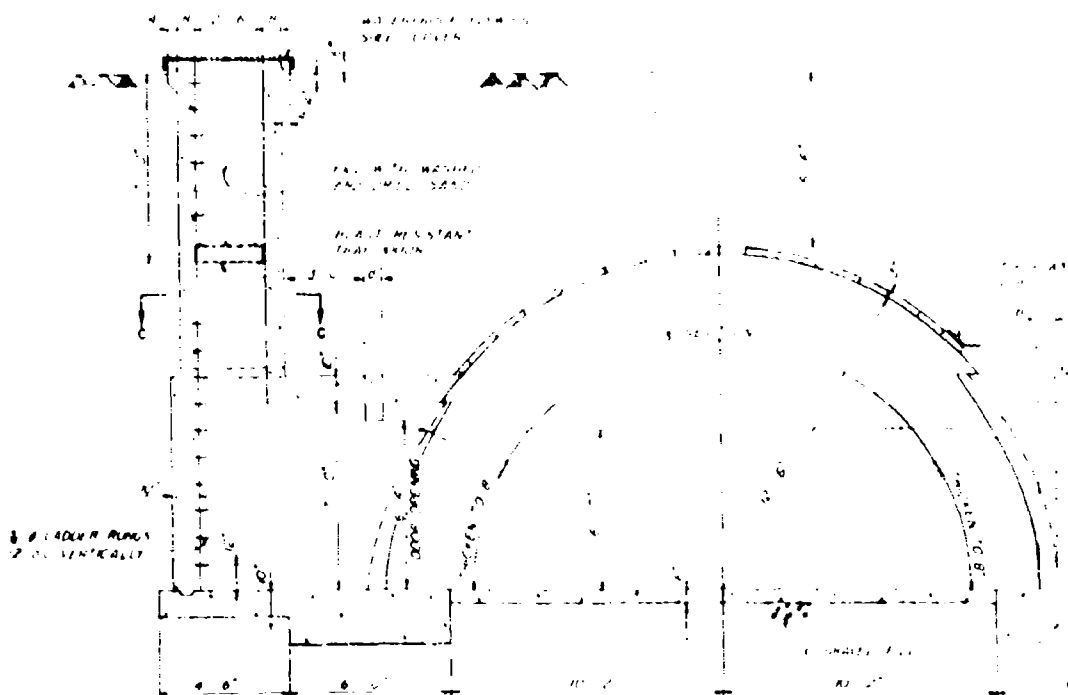
SECTION F-F  
SCALE 1/4"=1'-0"

2

<b>AMMANN &amp; WHITNEY</b> 111-8TH AVENUE NEW YORK, N.Y.		<b>DEPARTMENT OF THE ARMY</b> OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D.C.	
<b>PROTECTIVE CONSTRUCTION          GENERAL PURPOSE STRUCTURE          BURIED DOUBLE BARREL ARCH          50 PSI BLAST RESISTANT</b>			
DRAWN BY J.S. CHECKED BY J.S. APPROVED BY J.S. DATE 6-18-05	DATE 6-18-05	DATE 6-18-05	DATE 6-18-05
SHEET 2 OF 2		SHEET 2 OF 2	



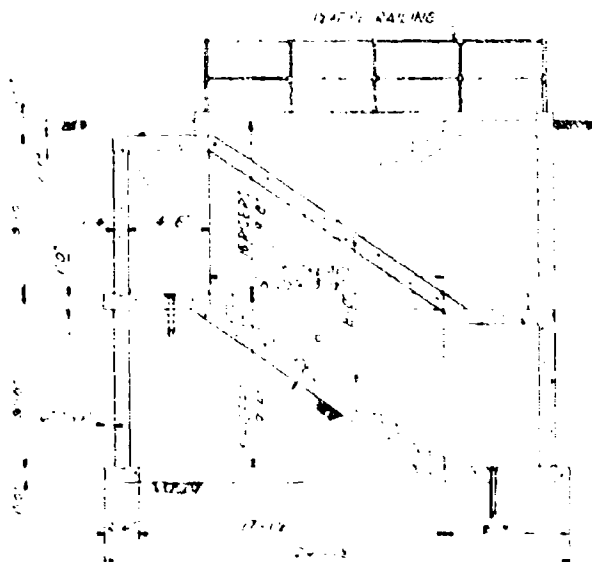
ROOF PLAN



SECTION A-A

## 68





SECTION 9-B  
NTS

<b>ANDREANN &amp; WHITNEY</b> ARCHITECTS 111 6TH AVENUE NEW YORK, N. Y.		<b>DEPARTMENT OF THE ARMY</b> OFFICE OF THE CHIEF OF ENGINEERS HEADQUARTERS, UNITED STATES ARMY WASHINGTON, D. C.	
PROJECT NO. DRAWING NO. SHEET NO. DATE BY CHECKED BY APPROVED BY		<b>PROTECTIVE CONSTRUCTION</b> <b>GENERAL PURPOSE STRUCTURE</b> <b>BURIED DOME</b> <b>50 PSI BLAST RESISTANT</b> DRAWING NUMBER <b>50-16-06</b>	

2





# DESIGN CONDITIONS

Design Procedure  
in accordance with DOE manual, "Design of Structures for Protection  
from the Effects of Atomic Weapons."

Blast Wave  
Peak incident pressure = 100psi Duration = 0.64 sec.

Blast Loading on Exterior Surface  
Peak pressure 100psi Duration = 0.64 sec.

Nuclear Radiation Protection  
Total gamma and neutrons attenuated to 50r for a 200RT  
weapon at any position which will produce a peak blast pressure  
equal to 100 psi.

Strength of Materials	Basic	Blast Design
Soil bearing capacity	8000 psi <sup>a</sup>	16,000 psi
Concrete, f <sub>c</sub>		
Dome	3000 psi	3900 psi
Remainder of Structure	5000psi	6500 psi
Rein. steel, lower yield	45,000psi	58,000psi
(Int. Grade, ASTM A305-50T)		
Structural steel, lower yield	38,000psi	46,000psi
(ASTM A7-50)		
<sup>a</sup> rated capacity of soil		

Allowable Stresses and Deflections  
The structure and entrance ways are designed for plastic deformation  
under design blast load. Other blast resistant entrance hatch doors are  
designed for maximum elastic deformation under design blast load.

## General Notes

1. The following features are not shown and shall be determined  
to suit use requirements.

Interior partitions

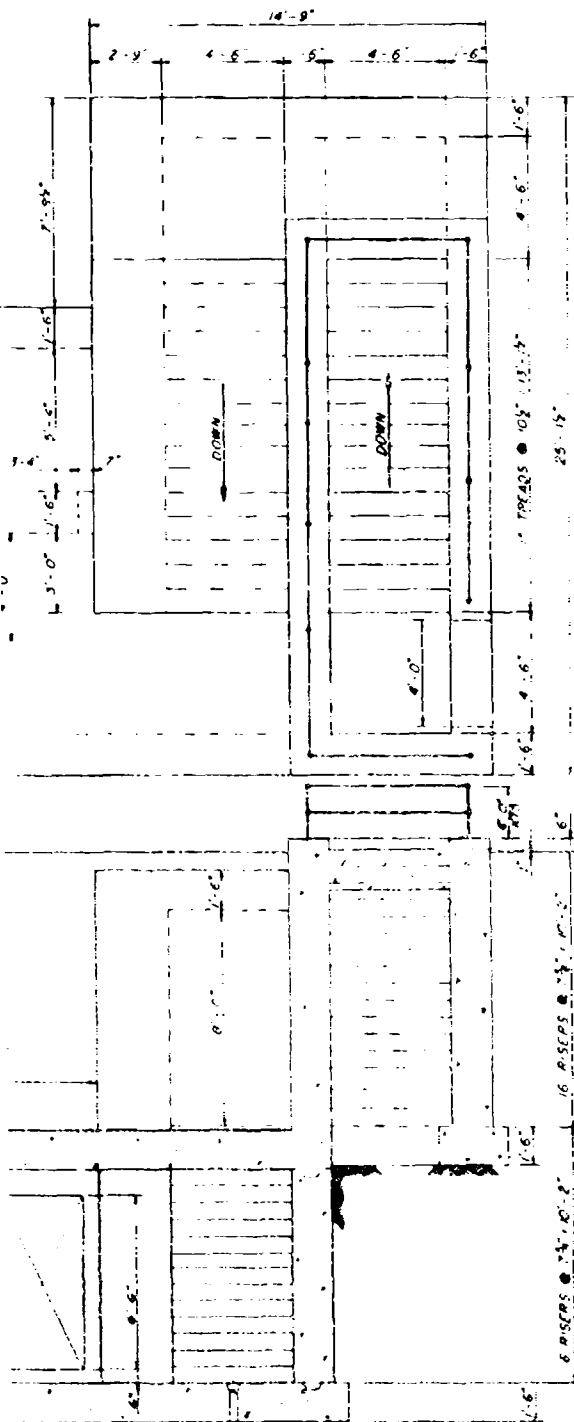
Mechanical and electrical equipment

Air locks and decontamination facilities

2. Access stairs may be varied as required.

3. Access ramp may be provided if required for vehicles.

4. Thermal protection to be applied to all exterior doors.



SHALL BEING STAIRS NOT SHOWN

2

<b>ANNMANN &amp; WHITNEY</b> CONSULTING ENGINEERS 111 6TH AVENUE, NEW YORK, N. Y.		<b>DEPARTMENT OF THE ARMY</b> OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.	
PROJECT NO. J.S. NAME OF J.S. DRAWN BY J.S. CHECKED BY J.S. DATE J.S.		<b>PROTECTIVE CONSTRUCTION</b> <b>GENERAL PURPOSE STRUCTURE</b> <b>BURIED DOME</b> <b>100 PSI BLAST RESISTANT</b>	
TITLE J.S.		SCALE J.S.	



# DESIGN CONDITIONS

## Design Procedure

In accordance with OCE manual, "Design of Structures for protection from the Effects of Atomic Weapons."

## Design Blast Wave

Peak Incident pressure = 800 psi; Duration = 0.11 sec.

## Blast Loading on Exterior Surface

Peak pressure = 247 psi; Duration = 0.41 sec.

## Nuclear Radiation Protection

Thermal shield and neutrons attenuated to 30% of a 5000 R/hr dose rate at 100 ft. which will produce a peak dose rate of 1.5 R/hr at 20 ft.

## Strength of Materials

Soil bearing capacity	Static 8000 psi	Blast Design 25,000 psi
Concrete, f <sub>c</sub>		
Dome	3000 psi	3900 psi
Reinforcing steel, f <sub>y</sub>	5000 psi	6500 psi
Reinforcing steel, lower yield	47,500 psi	52,000 psi
(Int. Grade ASTM A 305 50T)		
Structural steel, lower yield	36,000 psi	41,600 psi
(ASTM A 7-50)		
* rated capacity of soil		

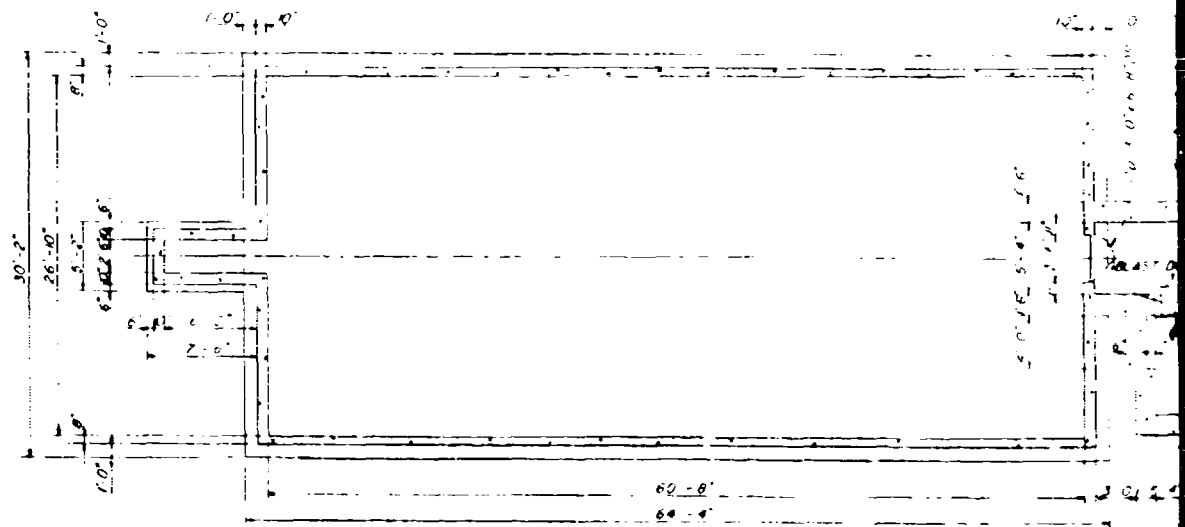
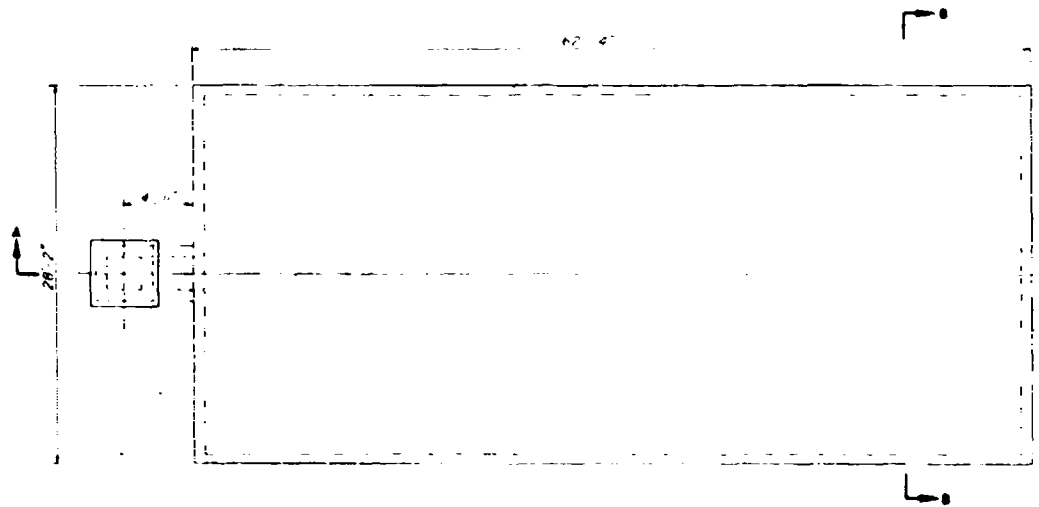
## Allowable Stresses and Deflections

The foundation and walls are designed for plastic deformation under design blast loads. Columns, beams and slabs are designed for maximum elastic deformation under design blast loads.

## General Notes

- The following features are not shown and shall be determined to suit use requirements:  
Interior partitions  
Mechanical and electrical equipment  
Air locks and decontamination facilities
- Access stairs may be varied as required.
- Access ramp may be provided if required for vehicles.
- Thermal protection to be applied to all exterior doors.

REVISION	DATE	DESCRIPTION	BY	APPROVAL
AMMANN & WHITNEY		DEPARTMENT OF THE ARMY		
CONSULTING ENGINEERS		OFFICE OF THE CHIEF OF ENGINEERS		
111 8TH AVENUE, NEW YORK, N. Y.		MILITARY CONSTRUCTION ENGINEERING DIVISION		
DRAWN BY		PROTECTIVE CONSTRUCTION		
CHECKED BY		GENERAL PURPOSE STRUCTURE		
DESIGNED BY		BURIED DOME		
APPROVED BY		200 PSI BLAST RESISTANT		
DATE		DRAWING NUMBER		
60-18-06		SHEET 1 OF 1		



## DESIGN CONDITIONS

### Design Procedure

Procedures with C-2, manual Design of Structures for Protection from the Effects of Atomic Weapons

### Design Blast Wave

Free field pressure = 50 psi Duration = 0.85 sec

### Blast Loading on Exterior Surface

Free pressure = 50 psi Duration = 0.85 sec

### Nuclear Radiation Protection

Free gamma and neutrons attenuated to 50% for a 100 KT weapon at any position which will produce a peak blast pressure equal to 50 psi

Strength of Materials	Static	Blast Design
Concrete compressive strength	8,000 psi	8,000 psi
Concrete $f_c$		
Steel	36,000 psi	36,000 psi
Aluminum of structure	50,000 psi	50,000 psi
Reinforcing steel yield	47,500 psi	52,000 psi
Reinforcing steel yield		
Structural steel yield	58,000 psi	4,600 psi
ASTM A 36		
Reinforcing steel yield		

### Allowable Stresses and Deflections

The structure and its components are designed for plastic deformation under design blast load. Plastic deformation and ultimate load are design blast load. Maximum plastic deformation under design blast load

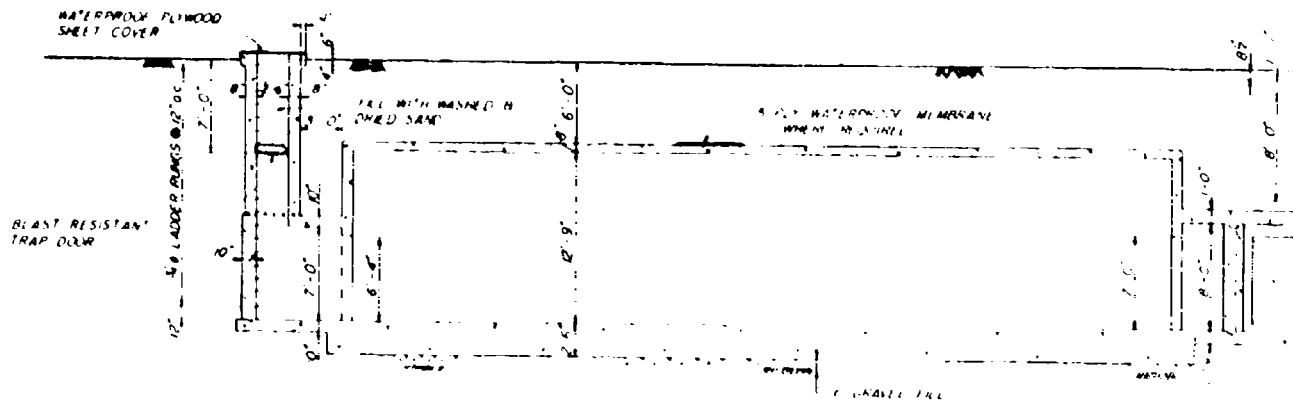
### General Notes

The following notes are to be read and shall be determined as per the requirements

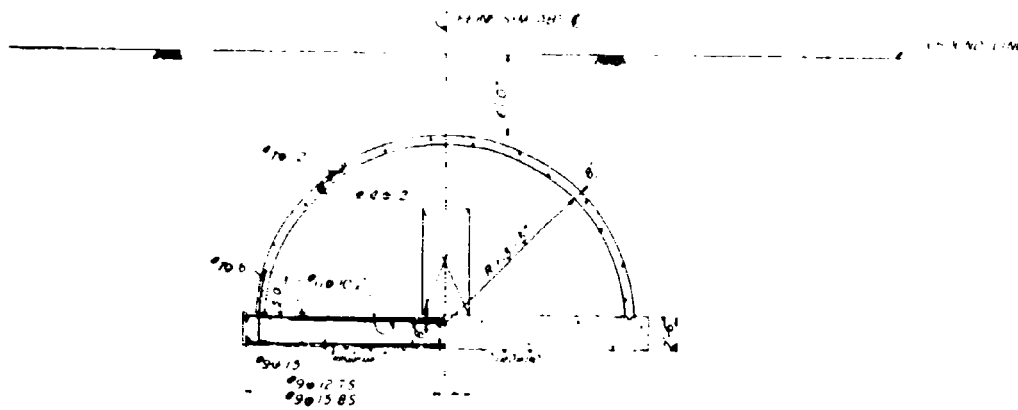
- Interior partitions
- Mechanical and electrical equipment
- Doors and windows
- Access doors shall be welded closed
- 3. All items may be protected if required for vehicles

AMMANN & WHITNEY CONSULTING ENGINEERS 111 5TH AVENUE, NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.	
PROJECT NO. 7-5		PROJECT NO. 7-5	
DESIGNED BY G.P.		DESIGNED BY G.P.	
CHECKED BY J. L. HARRIS		CHECKED BY J. L. HARRIS	
DATE JULY 1960		DATE JULY 1960	
BY J. L. HARRIS		BY J. L. HARRIS	
FOR THE ARMY J. L. HARRIS		FOR THE ARMY J. L. HARRIS	
SCALE 1/8" = 1'-0"		SCALE 1/8" = 1'-0"	
DRAWINGS INCLUDED 80-18-07		DRAWINGS INCLUDED 80-18-07	
SHEET NO. 1 OF 2		SHEET NO. 1 OF 2	

2



**SECTION A-A**

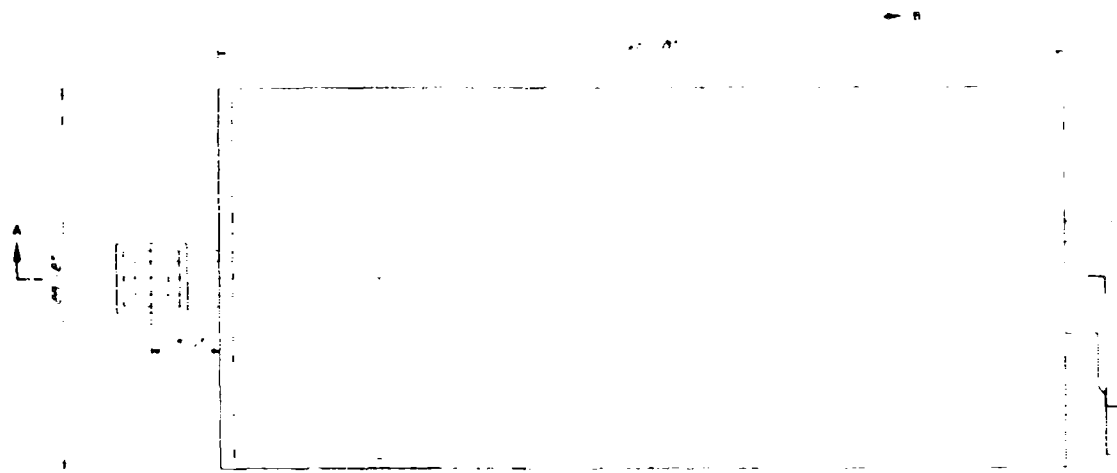


**SECTION B-B**

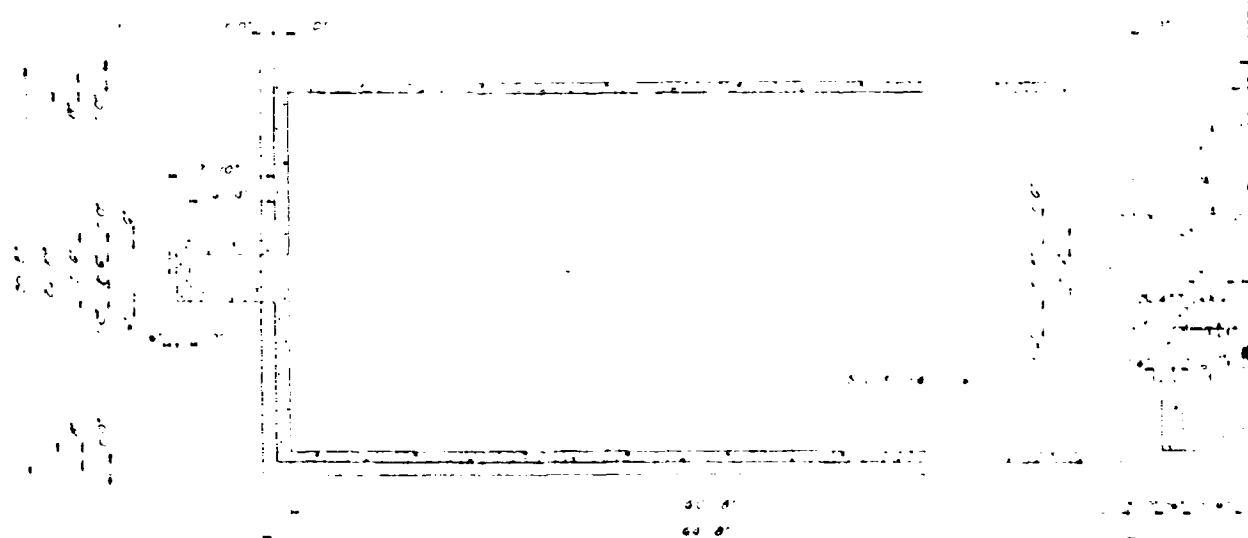


2

<b>ARMANN &amp; WHITNEY</b> GENERAL PURPOSE ENGINEERING 111 5TH AVENUE, NEW YORK, N. Y.		<b>DEPARTMENT OF THE ARMY</b> OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.	
PROJECT NO. DRAWING NO. SHEET NO.		<b>PROTECTIVE CONSTRUCTION</b> <b>GENERAL PURPOSE STRUCTURE</b> <b>BURIED CONCRETE 18000</b> <b>50 PSI BLAST RESISTANT</b>	
DATE BY CHECKED BY		SCALE 1" = 10'-0" 60-18-07 SHEET 2 OF 2	

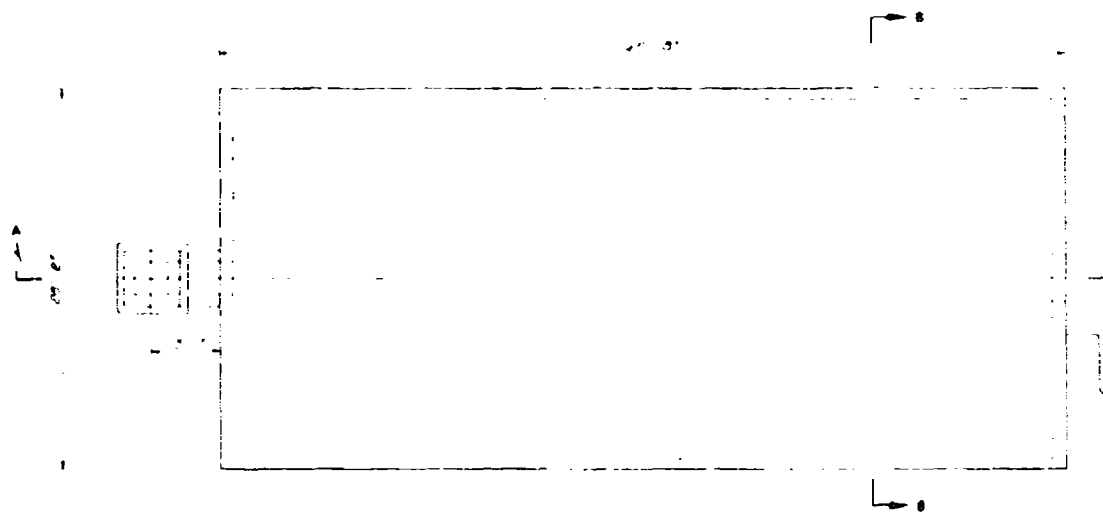


ROOF PLAN

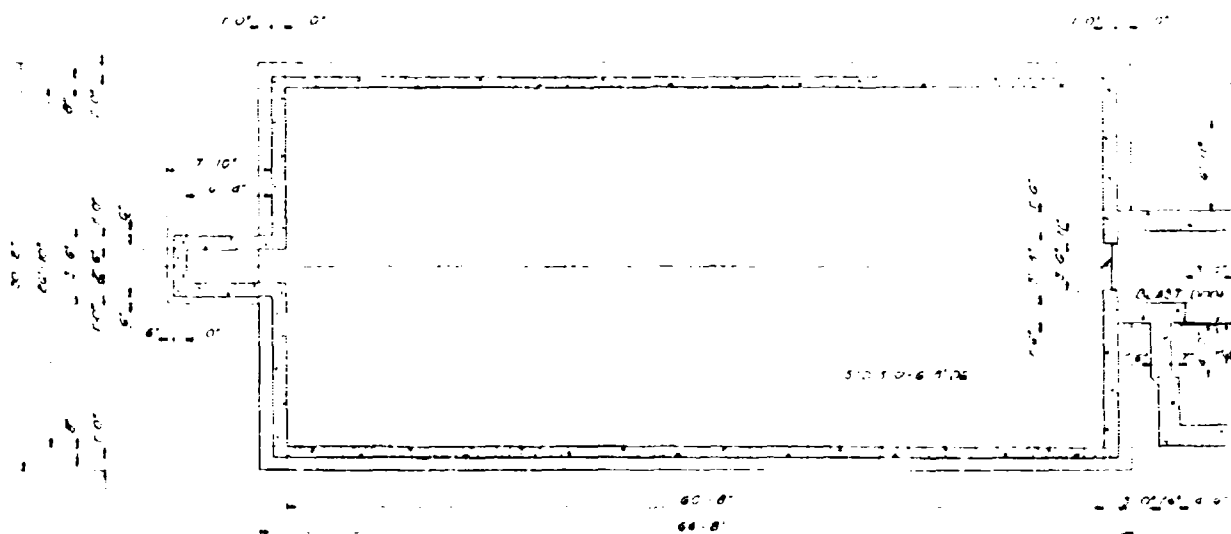


FLOOR PLAN





ROOF PLAN



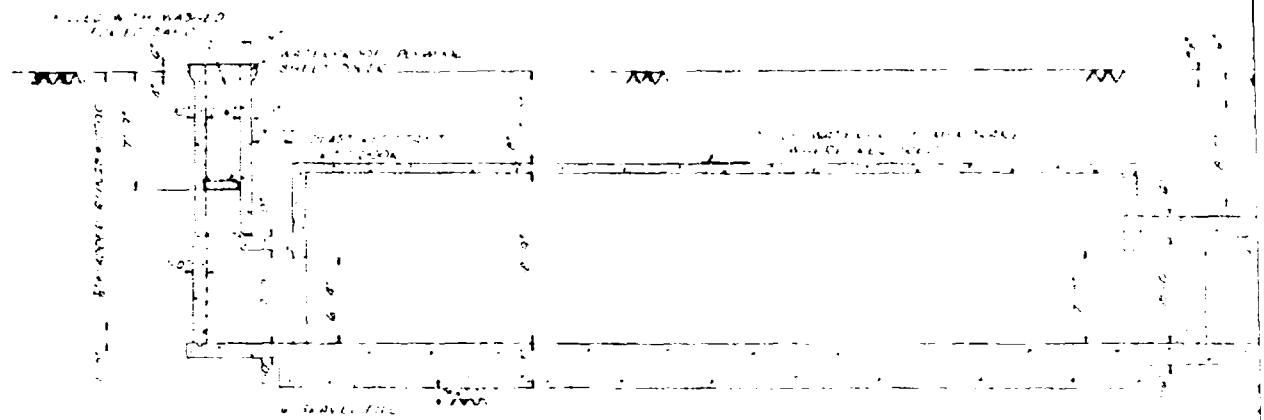
FLOOR PLAN

1

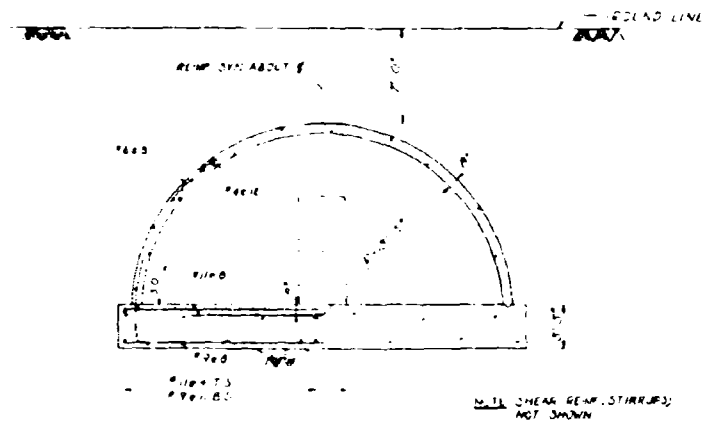
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*(Signature)*

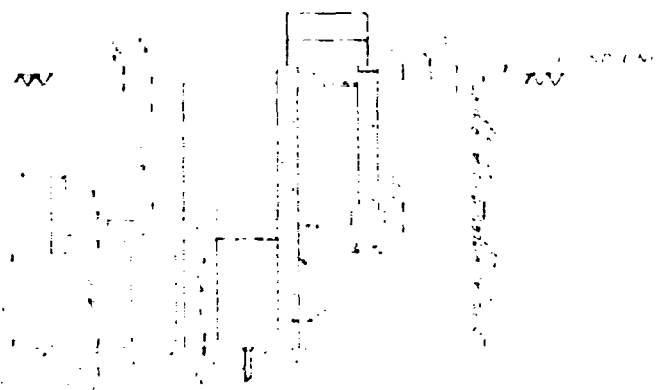
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SECTION A-A

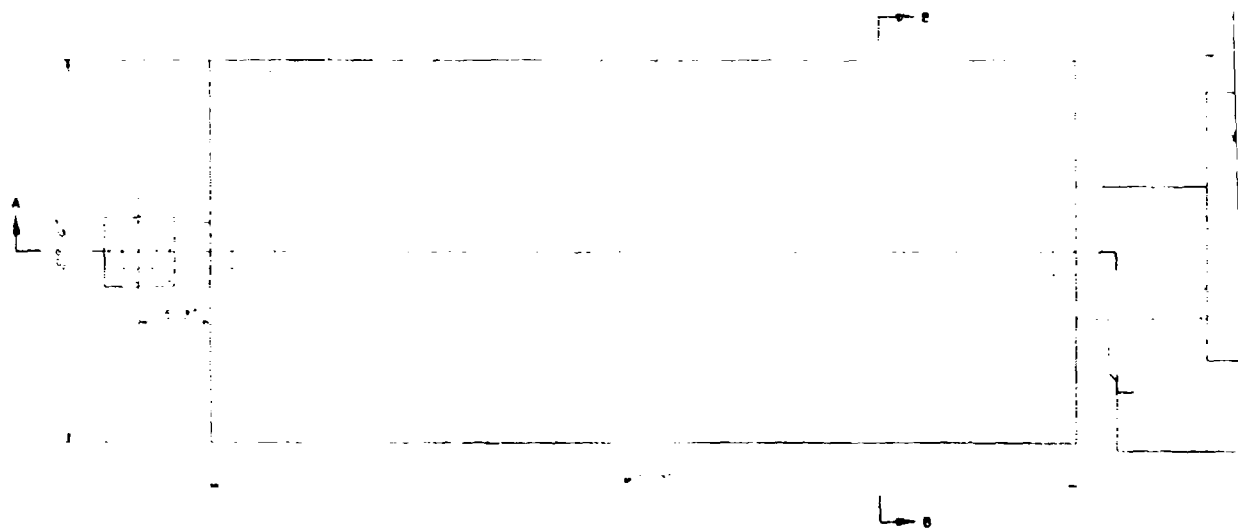


SECTION B-B

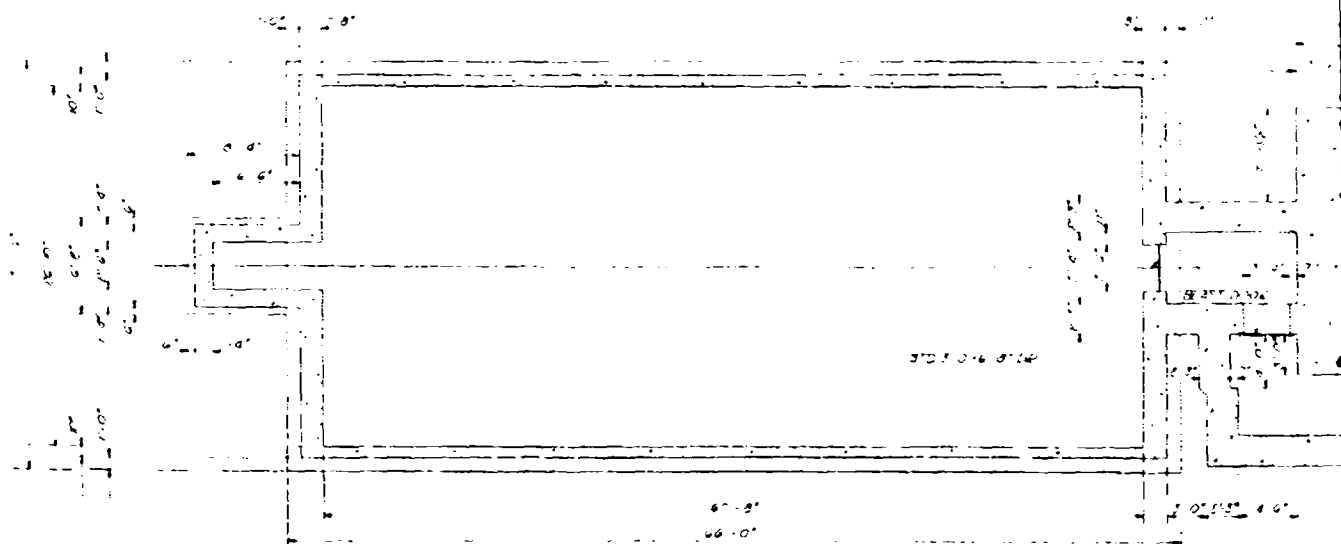


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AMMANN & WHITNEY CONSULTING ENGINEERS 111 7th AVENUE NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.	
DRAWN BY CHECKED BY IN CHARGE APPROVED		PROTECTIVE CONSTRUCTION GENERAL PURPOSE STRUCTURE BURIED CONCRETE 18000 100 PSI BLAST RESISTANT	
DATE 6-1-55		SHEET 2 OF 2	



ROOF PLAN



FLOOR PLAN

# DESIGN PROCEDURE

## Design Procedure

The design of the structure shall be based on the following assumptions:

### Design Assumptions

1. The structure shall be designed for a blast pressure of 200 PSI.

### Blast Loading on Exterior Surface

The blast loading shall be based on the following assumptions:

### Nuclear Radiation Protection

The structure shall be designed to provide protection against nuclear radiation from a source which will produce a peak blast pressure of 200 PSI.

### Strength of Materials

	Static	Blast Design
Concrete (compressive strength)	4000 PSI	4000 PSI
Steel (yield strength)	40,000 PSI	40,000 PSI
Reinforcing steel (yield strength)	40,000 PSI	40,000 PSI
Structural steel (yield strength)	40,000 PSI	40,000 PSI
Aluminum (yield strength)	30,000 PSI	30,000 PSI

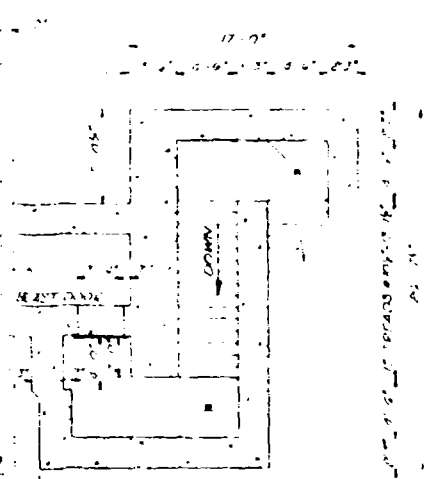
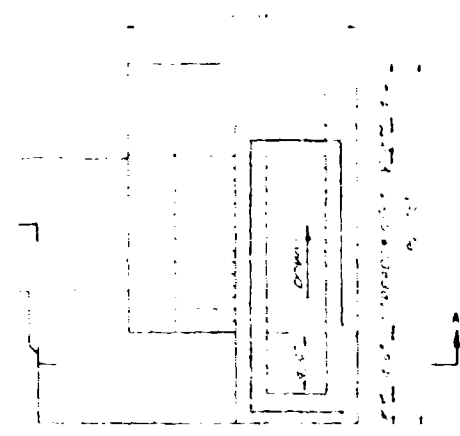
### Allowable Stresses and Deflections

The structure shall be designed to provide protection against nuclear radiation from a source which will produce a peak blast pressure of 200 PSI.

### General Notes

1. The following features are not shown and shall be determined by the user requirements:

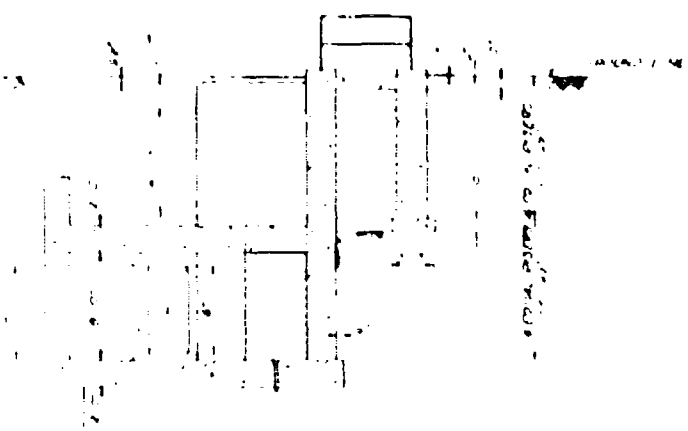
- Interior partitions
- Mechanical and electrical equipment
- Stairs and communication facilities
- Access doors may be provided as required
- Access ramps may be provided as required for vehicles
- The maximum height of the structure shall be determined by the user requirements



2

<b>AMN ANN &amp; WHITNEY</b> CONSULTING ENGINEERS 111 8TH AVENUE, NEW YORK, N. Y.		<b>DEPARTMENT OF THE ARMY</b> OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION SUBDIVISION 3-C	
DESIGN BY: <i>[Signature]</i> CHECKED BY: <i>[Signature]</i> APPROVED BY: <i>[Signature]</i> DATE: <i>[Date]</i>		<b>PROTECTIVE CONSTRUCTION</b> <b>GENERAL PURPOSE STRUCTURE</b> <b>BURIED CONCRETE IGLOO</b> <b>200 PSI BLAST RESISTANT</b>	
SHEET: <i>[Number]</i> OF: <i>[Total]</i>		DRAWING NUMBER: <b>60-10-07</b> SHEET 1 OF 2	

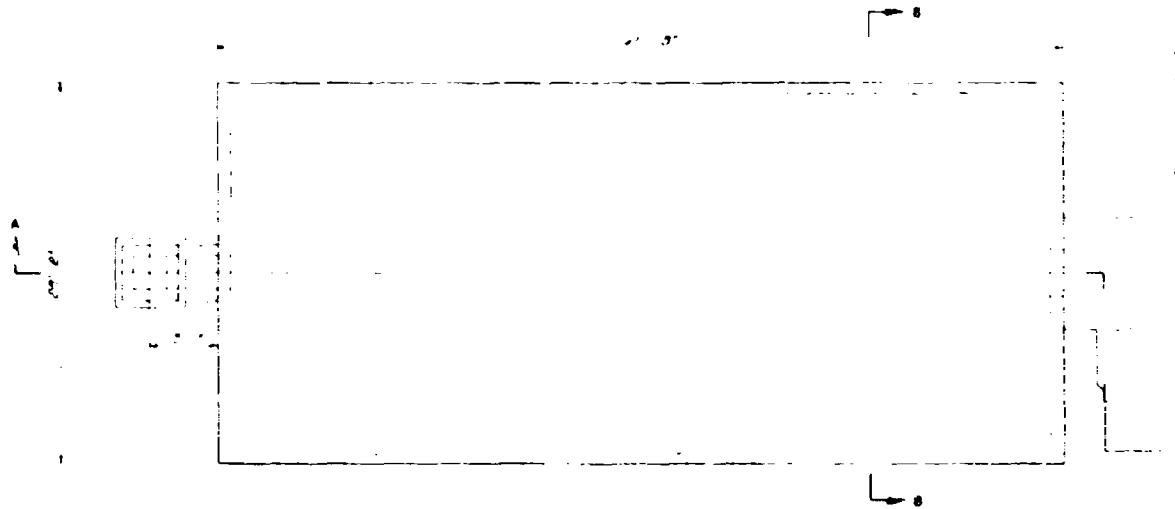




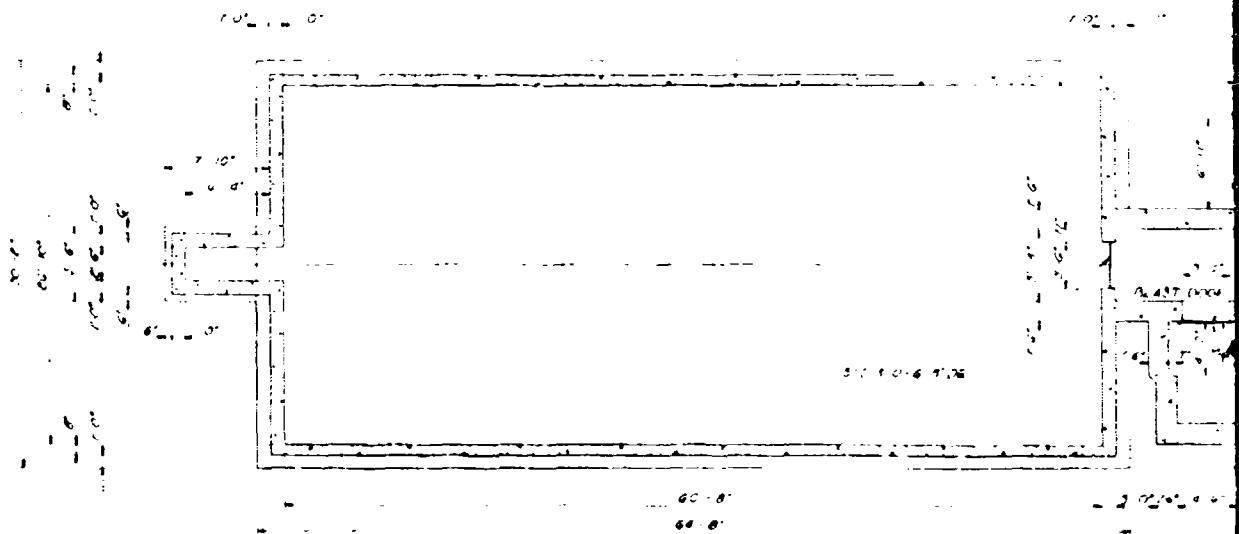
2

AMMANN & WHITNEY ENGINEERING CORPORATION 111 5TH AVENUE NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.	
PROJECT NO. 1-10		PROJECT TITLE <b>PROTECTIVE CONSTRUCTION GENERAL PURPOSE STRUCTURE BURIED CONCRETE 10100 200 PSI BLAST RESISTANT</b>	
DESIGNED BY J. H. H. H.		CHECKED BY J. H. H. H.	
DATE 60-10-07		SHEET 2 OF 2	





ROOF PLAN



FLOOR PLAN

# DESIGN CONTINUING

## Design Procedure

1. The structure is designed for a blast pressure of 100 PSI.

## Design Blast Wave

1. The blast wave is assumed to be a hemispherical wave.

## Blast Loading on Exterior Surface

1. The blast loading is assumed to be a uniform pressure.

## Nuclear Radiation Protection

1. The structure is designed for a radiation dose of 1000 R.

## Strength of Materials

	Static	Blast Design
Concrete	4000 PSI	4000 PSI
Steel	36,000 PSI	36,000 PSI
Reinforcing Steel	40,000 PSI	40,000 PSI
Structural Steel	36,000 PSI	36,000 PSI
Structural Steel	36,000 PSI	36,000 PSI
Structural Steel	36,000 PSI	36,000 PSI
Structural Steel	36,000 PSI	36,000 PSI
Structural Steel	36,000 PSI	36,000 PSI

## Allowable Stresses and Deflections

1. The allowable stresses and deflections are as follows:

## General Notes

1. The structure is designed for a blast pressure of 100 PSI.

2. The structure is designed for a radiation dose of 1000 R.

3. The structure is designed for a blast pressure of 100 PSI.

4. The structure is designed for a radiation dose of 1000 R.

5. The structure is designed for a blast pressure of 100 PSI.

6. The structure is designed for a radiation dose of 1000 R.

7. The structure is designed for a blast pressure of 100 PSI.

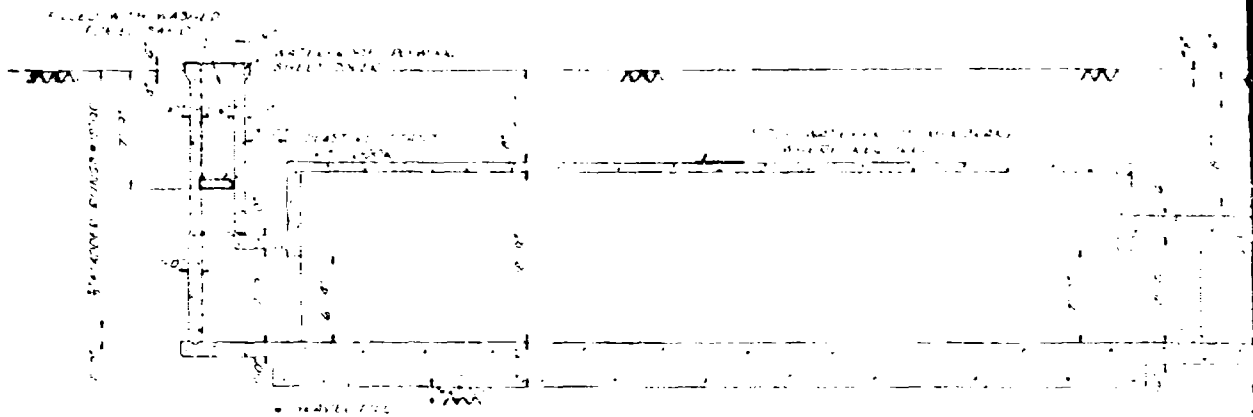
8. The structure is designed for a radiation dose of 1000 R.

9. The structure is designed for a blast pressure of 100 PSI.

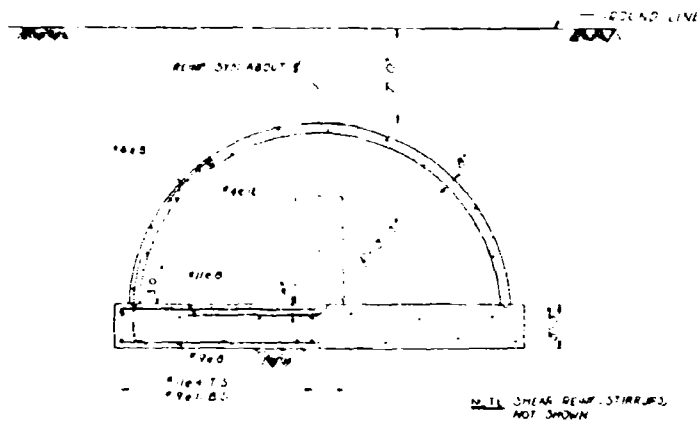
10. The structure is designed for a radiation dose of 1000 R.

2

AMMANN & WHITNEY CONSULTING ENGINEERS 111 8TH AVENUE, NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.	
PROJECT NO. 60-18-07		PROJECT NO. 60-18-07	
DRAWING NUMBER 60-18-07		DRAWING NUMBER 60-18-07	
DATE 10-1-57		DATE 10-1-57	
BY 10-1-57		BY 10-1-57	
CHECKED 10-1-57		CHECKED 10-1-57	
APPROVED 10-1-57		APPROVED 10-1-57	
PROJECT NO. 60-18-07		PROJECT NO. 60-18-07	
DRAWING NUMBER 60-18-07		DRAWING NUMBER 60-18-07	
DATE 10-1-57		DATE 10-1-57	
BY 10-1-57		BY 10-1-57	
CHECKED 10-1-57		CHECKED 10-1-57	
APPROVED 10-1-57		APPROVED 10-1-57	

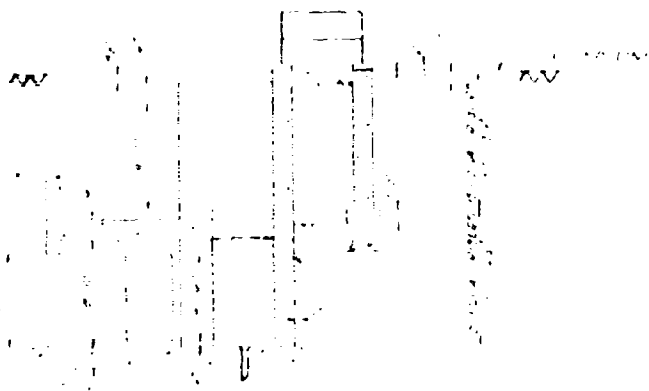


SECTION A-A



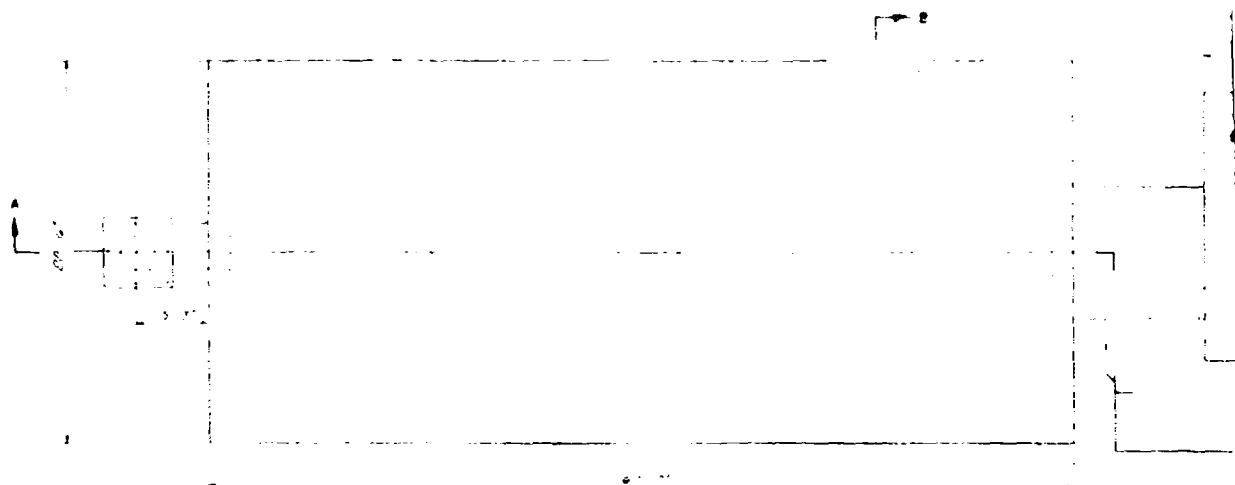
SECTION B-B

1

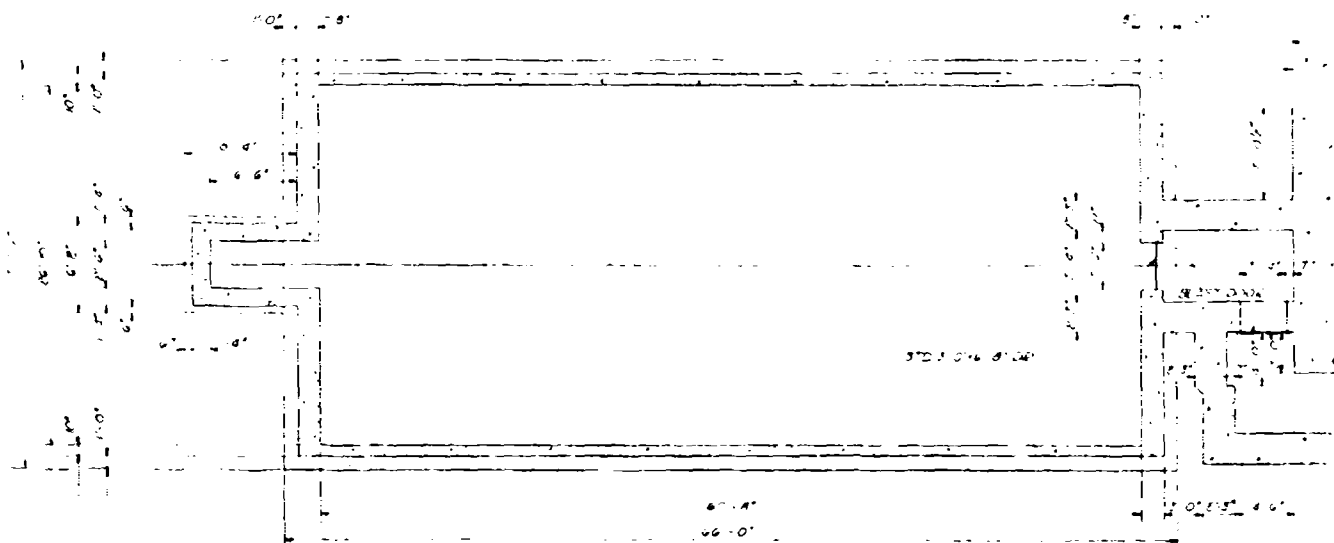


2

REVISION		DATE	DESCRIPTION	BY	APPROVED BY
AMMANN & WHITNEY		CONSULTING ENGINEERS		111 7th AVENUE, NEW YORK, N. Y.	
DEPARTMENT OF THE ARMY		OFFICE OF THE CHIEF OF ENGINEERS		MILITARY CONSTRUCTION ENGINEERING DIVISION	
WASHINGTON, D. C.					
DESIGN - J. M.		PROTECTIVE CONSTRUCTION			
FURNISHED BY		GENERAL PURPOSE STRUCTURE			
FOUNDED BY		BURIED CONCRETE 10100			
DESIGNED BY		100 PSI BLAST RESISTANT			
CHECKED BY					
APPROVED BY					
DATE		BY		SHEET	
60-10-07		2		2 OF 2	



ROOF PLAN



FLOOR PLAN

DESIGN 100-100

# Design Procedure

1. The structure shall be designed to resist the effects of the following loads:

## Design of the Walls

a. The walls shall be designed to resist the effects of the following loads:

## Blast Loading on Exterior Surface

1. The walls shall be designed to resist the effects of the following loads:

## Nuclear Radiation Protection

1. The walls shall be designed to resist the effects of the following loads:

## Strength of Materials

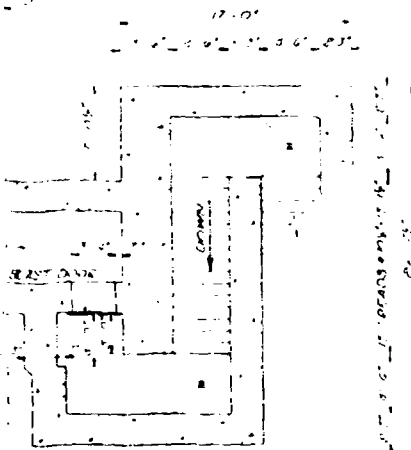
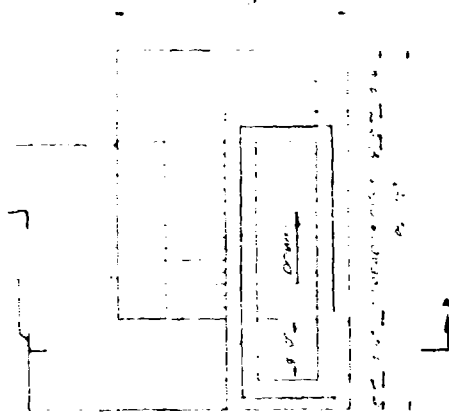
	Static	Blast Design
Concrete Strength	4,000 PSI	4,000 PSI
Reinforcing Steel	60,000 PSI	60,000 PSI
Welding Steel	70,000 PSI	70,000 PSI
Steel Plate	47,000 PSI	47,000 PSI
Steel Pipe	30,000 PSI	30,000 PSI

## Allowable Stresses and Deflections

The structure shall be designed to resist the effects of the following loads:

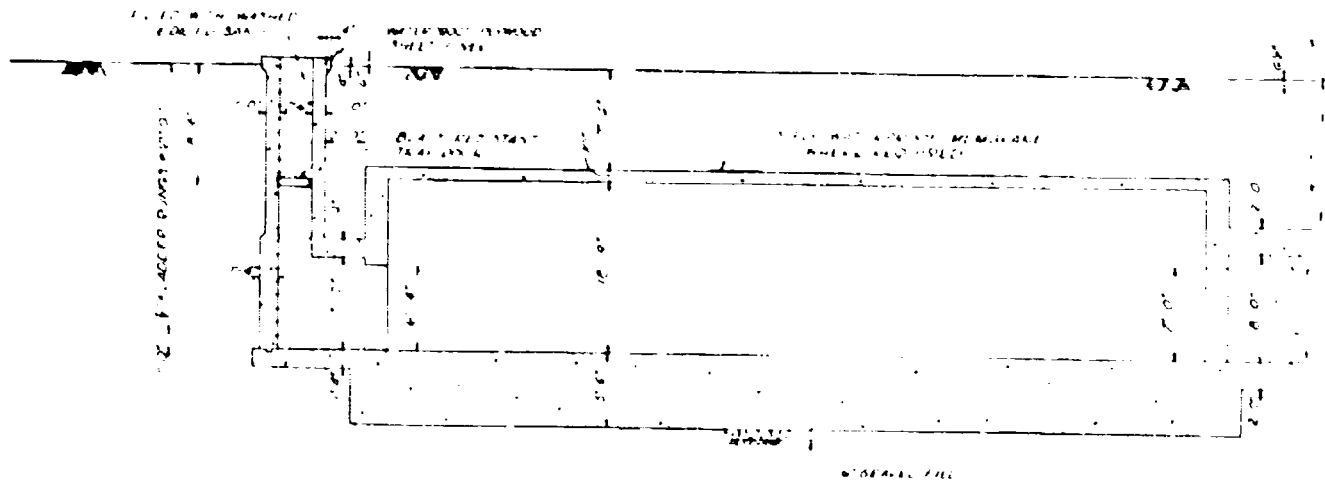
## General Notes

- The following features are not shown and shall be determined by the user:
- Interior Partitions
- Mechanical and electrical equipment
- Fire and explosion protection for pipes
- Access stairs may be added as required
- Access doors may be added as required for vehicles
- The maximum load to be applied to the structure shall be determined by the user

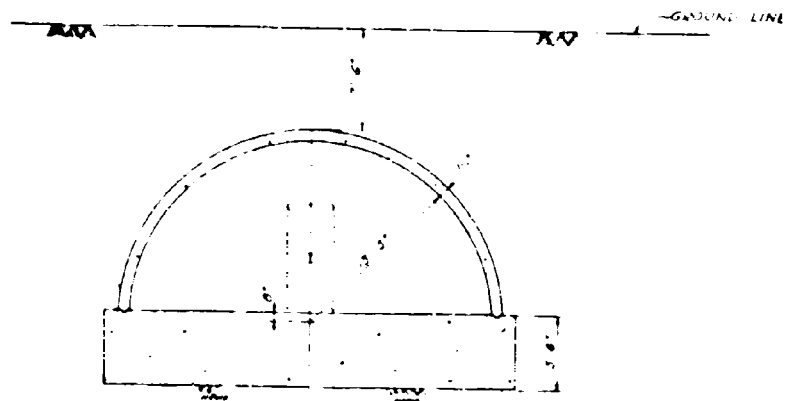


2

AMN ANN & WHITNEY CONSULTING ENGINEERS 111-8TH AVENUE, NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.	
DESIGNED BY JUN		CHECKED BY JUN	
DRAWN BY JUN		APPROVED BY JUN	
DATE JUN 1967		SCALE 1/4" = 1'-0"	
PROJECT PROTECTIVE CONSTRUCTION GENERAL PURPOSE STRUCTURE BURIED CONCRETE IGLOO 200 PSI BLAST RESISTANT		SHEET 1 OF 2	



**SECTION A-A**



**SECTION B-B**



2

AMMANN & WHITNEY GENERAL PURPOSE STRUCTURE 111 5TH AVENUE NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.	
PROJECT NO. F. J. 10		PROJECT TITLE <b>PROTECTIVE CONSTRUCTION GENERAL PURPOSE STRUCTURE BURIED CONCRETE 1600 200 PSI BLAST RESISTANT</b>	
DATE 1/10/50		BY 1/10/50	
DRAWN BY 1/10/50		CHECKED BY 1/10/50	
SCALE 1/4" = 1'-0"		SHEET 2 OF 2	